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JOURNAL
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ART. I.—*Descriptions of new species of Birds of the genera Selenidera, Gould, and Numida, Linnæus; and of a new genus and species of Rasorial bird in the Museum of the Academy of Natural Sciences of Philadelphia.*

By JOHN CASSIN.

1. SELENIDERA SPECTABILIS, Cassin.

SELENIDERA SPECTABILIS, Cassin, Proc. Acad., Philada., 1857, p. 214.

PLATE 1, Adult male.

Belongs to the same group of species as *Selenidera piperivora*, (Linnæus,) Gould, Monograph of Rhamphastidæ, pl. 36, (second edition,) and resembles it and other species of the same genus in general colors, but has the bill unusually large, and colored somewhat similar to the bill of *Ramphastos ambiguus*, Swainson, Gould, Monog., pl. 5. Rather larger than *S. piperivora*, or any other known species of this genus.

Colors of the upper mandible divided obliquely by a line running from below the nostril to the edge of the mandible, about one third of its length from the tip; upper portion and tip of upper mandible light greenish yellow, nearly pure yellow at the tip; lower portion and entire under mandible dark fuscous green, lighter at base. Bill at its base with an edging of black, as in some species of *Rhamphastos*.

Male. Head, neck, breast and abdomen, glossy black. Auricular feathers, light yellow; spaces on the sides deep orange yellow; tibiæ dark chesnut, under tail coverts scarlet. Upper parts of body, wings and tail, olive green; darker, and tinged with bluish ashy on the tail. Quills with their outer edges tinged with yellow, and their inner edges yellowish white, which is the color, also, of the under wing coverts.

Female. Head above dark chestnut; under tail coverts scarlet, mixed with

chestnut, especially on the longer feathers. All other parts like the male. No crescent on the back of the neck, nor tips of chestnut on the tail in any specimen.

Total length, about 15 inches; wing $5\frac{1}{2}$; tail 5; bill from the gape 4; from the nostril to tip of upper mandible $3\frac{1}{2}$ inches.

Hab. Provinces of Veragua and Choco, New Grenada. Discovered by Mr. Robert W. Mitchell of Philadelphia. Spec. in Mus. Acad., Philadelphia, and Nat. Mus. Washington.

This Toucan presents some remarkable and rather anomalous characters. Though having the yellow spots on the ears and sides, and in fact the usual colors which prevail in the group *Selenidera*, it has the bill parti-colored and variegated in some measure similar to that of *Ramphastos ambiguus*. It has the bill also longer and stouter than is usual, but more resembling that of *S. piperivora*, than any other bird of this genus. There is no crescent of yellow on the back of the neck, nor are the feathers of the tail tipped with chestnut, as in other species.

This bird is rather the largest of the genus *Selenidera*, all the known species of which are in the Museum of this Academy. The female differs from the male in having the head above dark chestnut, which is the case in other species of this genus.

The specimen first described by us in the Proceedings of the Academy, as above cited, was contained in a very interesting collection of birds contributed to its Museum by Mr. Robert W. Mitchell of Philadelphia, and made in the province of Veragua, the most northern portion of New Grenada. Since that period, other specimens have been brought to this country in a collection made by a party that surveyed a route for a ship canal across the Isthmus of Darien, in command of Lieut. N. Michler, U. S. Topog. Eng., by order of the Governments of the United States and of New Grenada. The interesting and valuable collection alluded to, is now in the National Museum, in charge of the Smithsonian Institution.

According to Mr. William S. Wood, Jr., who accompanied Lieut. Michler's party as naturalist, this Toucan was frequently seen in the province of Choco, New Grenada, and was not difficult to obtain. It appeared to be partial to a tree called *Cremantina* by the inhabitants, on the fruit of which it subsisted in a great measure.

2. NUMIDA PLUMIFERA, Cassin.

NUMIDA PLUMIFERA, Cassin, Proc. Acad., Philada., 1857, p. 321.

PLATE 2. Adult male and female.

Of the same subgeneric group (*Guttera*,) and bearing a general resemblance to *Numida cristata*, Pallas. Head in front with an ample crest of erect, narrow feathers, each of which is slightly expanded at the tip; occiput, throat and upper part of neck covered with short velvet-like feathers in the male, naked in the female. Bill rather thick, rictal membrane small; wing short, fourth and fifth quills longest; tertiaries

longer than primaries; upper and under tail coverts, ample and long, tail short, legs rather short, stout, toes rather long, claws but slightly curved, strong.

Colors generally resembling those of *N. cristata*, but not having the black of the neck and breast of that species. Crest in both sexes and downy plumage of the head in the male black; secondary quills with their outer webs yellowish white; tertiaries with narrow longitudinal stripes of bluish white on their outer and exposed webs. All other parts of the plumage, above and below, (including the neck and breast,) bluish black or slate color, with numerous small circular spots of bluish white, rather larger on the neck. Bill bluish horn color, lighter at the tip; legs dark in dried skin. Female similar to the male, but rather smaller; naked skin of the head dark, (naked in female only.)

Total length, about $16\frac{1}{2}$ inches; wing 9, tail 5 inches.

Hab. Cape Lopez, Western Africa; discovered by Mr. P. B. DuChaillu. Spec. in Mus. Acad., Philada.

This interesting addition to the ornithological fauna of Western Africa, is strictly of the same group of species as *Numida cristata*, Pallas, Spic. Zool., pl. 2; but is readily to be distinguished by its erect crest, which is quite peculiar, and strongly characterizes this bird. It has not either the black neck and breast of the species mentioned. Specimens of both sexes are very similar to each other, but the male appears to be constantly distinguished in having the head covered as described above, which in the female is naked, or with a few hair-like or downy feathers. The white spots on all parts of the body are smaller than in *N. cristata*, and extend to the neck, breast and tibiae, which in that species are black.

This bird is one of the most important of the numerous ornithological discoveries of Mr. P. B. DuChaillu, an enterprising and talented young traveller and naturalist, who has been for several years in Equatorial Africa, under the auspices of gentlemen of this Academy. According to Mr. DuChaillu, this bird was met with in small flocks from fifty to one hundred miles in the interior from Cape Lopez, but was unknown to the inhabitants on the sea coast.

Genus PHASIDUS, Cassin.

PHASIDUS, Cassin, Proc. Acad., Philada., 1856, p. 322.

Allied to *Numida*, Linnæus, and *Agelastus*, Temminck, but more resembling the latter. General form rather light, but robust, and adapted to walking or running, head naked, wing rather short, tertiaries longer than the primaries; fifth and sixth primaries longest, tail moderate, legs rather long; tarsi strong with large hexagonal or irregularly shaped scales obliquely inserted in front and smaller behind; toes moderate, united at base by a large membrane; hind toe short; claws sharp and rather strong. Bill rather wide, curved and rounded at the point; cere large; aperture of the nostril large.

3. PHASIDUS NIGER, Cassin.

PHASIDUS NIGER, Cassin, Proc. Acad., Philada., 1856, p. 322.

PLATE 3. Adult male.

Head naked, but with a longitudinal stripe of short, black feathers, from the base of the bill to the occiput, ending abruptly and with the feathers rather longer at the occiput. Neck before and throat with a few short black feathers, neck behind (below the bare space) densely covered with short black feathers, uniting with the plumage of the upper part of the body. Bill curved, gape rather wide.

Entire plumage black, very slightly and obscurely punctated, and vermiculated with a lighter shade on the upper parts, and of rather lighter shade on the abdomen. Bill horn color, with the edges of the mandibles nearly white; legs dark in dried specimen, naked space on head and neck probably yellow or light red in living bird. Shafts of primaries white on their under surface.

Total length about 17 inches, wing 8, tail 6 inches. Male.

Hab. Cape Lopez, Western Africa. Discovered by Mr. P. B. DuChaillu. Spec. in Mus. Acad., Philadelphia.

This is the most remarkable bird yet discovered by Mr. DuChaillu. It belongs to the same group as *Numida* and *Agelastus*, but is more intimately allied to the latter, of which the only known form is *Agelastus meleagrides*, Temminck, Cabanis' Journal, 1855, p. 356; also in the museum of this Academy, through the liberality of Prof. Temminck, by whom it was first introduced to the notice of naturalists.

According to Mr. DuChaillu, this interesting bird was met with by him during the same journey and at about the same distance from the coast as the preceding, and like it was unknown to the inhabitants at the Cape. He obtained but a single specimen, which is labelled as a male. The general appearance of this bird is not unlike that of *Gallophasius purpureus*, Gray, from which, however, it is generically distinct.

ART. II.—*Catalogue of Coleoptera of the Regions adjacent to the Boundary Line between the United States and Mexico.*

By JOHN L. LE CONTE, M. D.

Since the time when the entomological productions of Kansas were made known to science by Thomas Say, no expedition under the direction of government has so largely contributed to a correct knowledge of the insect fauna of Western North America as the United States and Mexican Boundary Survey. *

Not only have large numbers of new genera and species been added to science, but the limits of many previously known species have been ascertained, and new points fixed for the final solution of the intricate problems of geographical distribution.

Many of the new species added to our fauna vie with the most splendid productions of the tropics, while others by their curious forms are in strong contrast with the usually dull and ordinary appearance of the Coleoptera of the United States.

As the collections were made in a continuous belt of country extending from the Gulf of Mexico to the Pacific Ocean, they serve well to illustrate the remarkable changes in fauna, dependent on longitude: an element, on this continent, of much greater importance than latitude in determining the distribution of organized beings.

*This catalogue is the preliminary portion of a report on the Coleopterous insects collected by the U. S. and Mexican Boundary Commission, which was prepared at the request of the Commissioner; after its preparation, involving a labor of fifteen months, was completed, information was given me that its publication had not been provided for, and recently the MS. has been returned to me, with a letter from the Hon. Secretary of the Interior, in which occurs the following passage: "Its publication in the second vol. of the Report of Major Emory is inadmissible from the fact that Major Emory appears not to have contemplated it in his correspondence with this Department, previous to his turning over the work, and his departure for the West. In his letter of October 7th, 1857, he says, 'The second vol. is composed of Zoology and Botany, Prof. Baird writes the Zoology, and Dr. Engelmann writes the section on Botany relating to Cactaceæ, Dr. Torrey writes the remainder of the Botany.'"

The points worthy of the attention of the scientific student here presented are two-fold: 1st, that the Commissioner should not have contemplated in his correspondence with the Department the publication of material that he had already *requested to have prepared* for the Report: 2nd, the exclusion by the Commissioner of Entomology from Zoology, by the statement that "Prof. Baird writes the Zoology," when the facts were that only the Vertebrata were undertaken by my learned scientific friend.

I do not desire to be understood as attaching blame to any person in this matter, but make this statement for the purpose of accounting for my own apparent idleness in science for a period.

I also take occasion here to return my grateful acknowledgements to the Hon. J. Thompson, Secretary of the Interior, for the use of the lithographic plate prepared to illustrate the Report.

Near the Pacific coast, that is to say, as far east as the Sierra of California, another element of a more directly evident character, may be noted in connection with the same subject: it is the effect of the Arctic current which sweeps along the Californian coast, and equalizes the climate of the maritime portion of the State. On the crest of the Sierra this effect ceases, and the influence of the cold current is combated by the continental climate, which gives a region of extreme dryness during the whole year, with great ranges of temperature, in different portions of the day and year. This region, broken only by a few fertile mountain valleys in its eastern part, extends from the Californian sierra to the Rio Grande, when in the gentle descent to the Gulf of Mexico the climate again becomes more equable, assuming, however, the subtropical character belonging to its latitude.

We accordingly find that in Texas a large proportion of the Coleoptera are identical with those found both at New York and New Orleans, the difference of latitude being accompanied with but moderate variation; others are tropical species found in the adjoining portions of Mexico, and some again represent sparingly the group of Tenebrionidæ which play such an important part in the insect fauna of the regions farther west. Among genera not belonging to these categories must be noted *Lutrochus*, which here makes its first appearance in North America: the other species are found in South America, in Brazil.

The manner in which the catalogue of species is made, obviates the necessity of forming statistical tables of distribution, but I have placed at the end of the present remarks some abstracts, which will be found of interest to the general student.

It therefore remains for me only to note specially the collections from which the materials used in the present investigation have been obtained; they are briefly as follows:

1. Collections made by Mr. J. D. Clark, in Texas, near the Rio Grande, at Frontera, and at San Antonio.
2. Extensive collections made by Mr. Arthur Schott at Eagle Pass, Texas, and on the journey from Laredo to Ringgold Barracks.
3. A fine series collected by Mr. Weise, on the journey last named.
4. Very thorough collections made by Mr. Horace Haldeman in various portions of Texas.
5. A small, but valuable set, collected at New Braunfels, Texas, and purchased from Mr. Lindheimer.
6. Large collections made by Dr. Thos. H. Webb in the region between the Rio Grande and Colorado River of California, chiefly in the valley of the Gila.
7. A considerable collection made by Mr. Schott in the region last acquired by purchase from Mexico, and now called Arizona.
8. A collection of considerable size made by Capt. Pope, while exploring Llano Estacado and the upper Rio Grande.

9. Large collections made by myself, in 1850–51, between San Diego, California, and Fort Yuma on the Colorado River. An excursion from the latter point to Tucson furnished but small results, as the season was unfavorable, and subsequent loss of transportation required my attention to be directed from science, to objects of more vital importance.

Notwithstanding the copious materials here brought together, the region reported on must furnish still important results to future collectors. Every collection that has yet been made, has furnished a very large proportion of new species, and with few exceptions the same species have not occurred at different places or times. The minute ones, except in the region visited by myself, have received but little attention : an immense number yet remain.

Exception has been made in the Catalogue of six or seven Curculionidæ of which the genera could not be determined, and of many Staphylinidæ, which should not be described, until a monograph of all the species found in the United States be prepared. Several species of Heterocerus are also allowed for the present to remain unnamed. Various species which have recently been procured, or which have remained undescribed are added in order to bring the catalogue fully up to the present time.

TABLE OF THE DISTRIBUTION OF GENERA ACROSS THE CONTINENT.

Columns I. II. and III. as in the table of species.

I.	II.	III.	
163	163	163	a. Apristus, Stenomorphus, Halipus, Cnemidotus, Hydrochares, Cyclonotum, Catops, Faronus, Othius, Leptacinus, Elater, Cardiophorus, Enoplium, Anobium, Ptilinus, Exops, Nosoderma, Helops, Platydema, Phaleria, Eurygenius, Hylesinus, Chrysochus, Microrhopala, Chilochorus.
69	69		b. Eunectes, Triorophus, Eurymetopon, Centrioptera, Coniontis, Eusattus, Noti-bius, Conibius, Microschatia, Pelecyporus, Eleodes, Tanarthrus, Crossidius.
25 ^a		25 ^a	c. Including the following not found north of Texas : Dromochorus, Gynandro-tarsus, Lutrochus, Eugastra, Lasiopus, Scaptolenus, Astrotus, Mannophorus, Sphe-nothecus.
	13	13 ^b	d. Melanotus, Erotylus, Plusiotis, Orsonyx, Oncerus, Gyascutus, Thrincopyge, Schizopus, Edrotes, Craniotus, Cerenopus, Anchmobius, Aræoschizus, Batulius, Anepsius, Cryptoglossa, Euschides, Embaphion, Dacoderus, Cysteodemus, Eupom-pha, Phodaga, Amannus, Euryscopa, Calyptobium.
57 ^c	25 ^d		e. Philotecnus, Acephorus, Thinopinus, Anchomma, Rhagodera, Physemus, Aph-ricus, Plastocerus, Euthysanius, Malachius, Microlipus, Atelestus, Cryptadius, Nyctoporis, Amphidora, Apocrypha, Cononotus, Coelus, Eulabis, Epantius, Bius, Cœlocnemis, Prionychus, Emphyastes, Perarthrus, Ipochnus.
		26 ^e	

TABLE OF SPECIES EXTENDING ACROSS THE CONTINENT.

Column I. contains species found in the Rio Grande valley ; II. marks those from Rio Grande valley to the Californian sierra ; III. those found in maritime California. Brackets are used to denote that the species has been found in a region north of that embraced in the present Report, but belonging to the same range ; it is therefore to be inferred that such species will eventually be found within the limits here treated of.

	I.	II.	III.		I.	II.	III.
Megacephala carolina, . . .	*	*		Polyphylla cavifrons, . . .	*	*	
Cicindela hirticollis, . . .	*	*	*	Listrochelus mucoreus, . . .	(*)	*	
— tenuisignata, . . .	*	*		Macroductylus, . . .	(*)	*	
— sedecimpunctata, . . .	*	*		Euparia cognata, . . .	*	*	
Brachinus lateralis, . . .	*	*		Omorgus integer, . . .	*	*	
Lachnophorus elegantulus, . . .		*	(*)	Melanophila longipes, . . .	*	*	
Lebia furcata, . . .	(*)	(*)	*	Chrysobothris octocola, . . .	*	*	
Platynus extensicollis, . . .	(*)	*		— exesa, . . .	*	*	
— decorus, . . .	(*)	*		Agrilus politus, . . .	(*)	*	
— fossiger, . . .		*	*	Monocrepidius lividus, . . .	*	*	
Pterostichus Isabellæ, . . .		*?	*	Agrypnus Sallæi, . . .	*	*	
Amara californica, . . .		*	*	Alaus gorgops, . . .	*	*	
Bradycellus nubifer, . . .		*	*	Chauliognathus scutellaris, . . .	*	*	
Harpalus impotens, . . .	*	*	*	Rhadalus testaceus, . . .	*	*	
Chlænien obsoletus, . . .		*	*	Clerus Spinolæ, . . .	*	*	
Pasimachus validus, . . .		*		Apate punctipennis, . . .	*	*	*
Clivina corvina, . . .	(*)	*	*	Lyctus striatus, . . .	(*)		*
Bembidium patrule, . . .	(*)	(*)	*	Epitragus canaliculatus, . . .	*	*	
— pictum, . . .		*	*	Eurymetopon abnorme, . . .	*	*	
Calosoma scrutator, . . .	*	*	*	Pelecyphorus elatus, . . .	*	*	
Hydroporus striatellus, . . .	*	*	*	Eleodes quadricollis, . . .		*?	*
Laccophilus truncatus, . . .		*	*	Blapstinus dilatatus, . . .	*	*	*
Colymbetes binotatus, . . .	(*)	*	*	Platydemia flavipes, . . .	(*)		*
Agabus lugens, . . .		*	*	Notoxus monodon, . . .	(*)		*
Cybister ellipticus, . . .	*	*	*	Tanarthrus alutaceus, . . .		*	*
Eunectes sticticus, (Europe) . . .		(*)	*	Mordella scutellaris, . . .	(*)		*
Berosus punctulatus, . . .		*	(*)	Nemognatha apicalis, . . .	*		*
Hydrophilus triangularis, . . .	*	*	*	Dendrobias quadrimaculatus, . . .	*	*	
— limbalis, . . .		*	*	Stenapis solitaria, . . .	*	*	
— californicus, . . .		*	*	Crossidus testaceus, . . .	*	*	*
Cercyon capillatum, . . .		*	*	Clytus luscus, . . .	*	*	
Silpha lapponica, . . .	*	*	*	Tetraopes basalis, . . .	*		*
— ramosa, . . .		(*)	*	Pachybrachys cælatus, . . .		*	*
Saprinus lugens, . . .	*	*	*	Doryphora Haldemani, . . .	*	*	
Phalacrus penicellatus, . . .		(*)	*	Chrysomela serpentina, . . .	*	*	
Temnochila chlorodia, . . .		*	*	Haltica torquata, . . .		(*)	*
Dermestes vulpinus, . . .	*	*	*	Diabrotica 12-punctata, . . .	*	*	*
Ligyryus gibbosus, . . .	*	*	*	Hippodamia convergens, . . .	*	*	*
Allorhina nitida, . . .	*	*		— maculata, (Europe.) . . .	(*)	*	*
Polyphylla 10-lineata, . . .	*	(*)		Coccinella abdominalis, . . .	*	*	*

	I.	II.	III.
	13+(3)	14+(2)	16
Total results of the distribution of species.	30+(5)	34+(1)	
		18+(7)	20+(2)
	3		2+(1)

The tables of distribution of genera across a more northern position of the Continent, published by me in the Pacific R. R. Report on the 47th Parallel, having become modified by the progress of discovery, and otherwise containing certain errors, may be here added in a corrected form, for the purpose of illustrating farther the results obtained above.

TABLE I. *Genera common to the Eastern and Western Continents.*

NAMES OF FAMILIES.	Total number of genera.	RUSSIAN AMERICA.		OREGON.		CALIFORNIA.	
		In Atlantic States.		In Atlantic States.		In Atlantic States.	
Adephaga,	47	27	4	26	2	36+2?*	1
Silphales,	11	8	3	2	1	3	1
Staphylinidæ,	42	25	5	Not collected.		30	
Scarabæidæ,	8	2		5		7+1†	
Elateridæ,	11	5		10		9	
Tenebrionidæ,	6	1		3		4	1
Cerambycidæ,	17	11	1	13	2	10	2
Chrysomelidæ,	16	6		10	1	13	1

* Callida, Patrobus. † Sinodendron; a species from the Atlantic States is described by Beauvois.

The genera of the table which have not been found in the Atlantic States are :

In Russian America.—Miscodera, Leistus, Pelophila, Trachypachys, Necrophilus, Sphærites, Lyrosoma, Bolitochara, Syntomium, Phlæonæus, Arpedium, Deliphrum, Rosalia.

In Oregon.—Callisthenes, Trachypachys, Necrophilus, Ergates, Rosalia, Timarcha.

In California.—Anillus, Necrophilus, Calcar, Ergates, Mesosa, Timarcha.

Of these Callisthenes is found in the central portion of the continent, though not extending to the proper maritime Atlantic region.

It will be observed that many of these genera just mentioned are subarctic forms, and may be expected to occur hereafter in Labrador. The genus Ergates must be also received with caution into this list, as the same species is ranked in the British Museum Catalogue under Macrotoma, a genus of much more extensive distribution. We have then remaining of genera as yet known only in the temperate zone, found on the western slopes of the two continents, but absent from the Atlantic slope of America, only Anillus, Rosalia, Mesosa and Timarcha.

TABLE II. *Genera peculiar to America.*

NAMES OF FAMILIES.	Total number of genera.	RUSSIAN AMERICA.			OREGON.			CALIFORNIA.		
		In Atlantic States.		Not in Atlantic States.	In Atlantic States.		Not in Atlantic States.	In Atlantic States.		Not in Atlantic States.
Adephaga,	17	1*	A.	B.	1	A.	B.	5+1?	A.	B.
Staphylinidæ,	2			1+1?	Not col.	Not col.		1	1	7
Scarabæidæ,	7				4			4		2
Elateridæ,	7	1			2			3		1
Tenebrionidæ,	19			1	2	2	1	2	4†	12
Cerambycidæ,	6			2	2		4	1		1? ‡
Chrysomelidæ,	4				2			4		

*Pristodactyla: these species are included by Schaum in Calathus, and the genus should therefore not be placed in this table by those adopting that view.

† Triorophus, Eurymetopon, Eleodes, Coniontis. ‡ Oenemona?

The columns headed A contain genera found in the central desert region of Kansas, New Mexico, Upper Texas, and Arizona, and do not extend into the Atlantic region proper. Those headed B therefore contain the genera peculiar to the maritime Pacific slope.

The genera in the above table which are found in the Atlantic States are:

In Russian America.—Pristodactyla?, Epiphanis.

In Oregon.—Haplochile, Ligyrus, Diplotaxis, Dichelonycha, Canthon, Alaus, Asaphes, Nosoderma, Blapstinus, Desmocerus, Tetraopes, Saxinis, Microrhopala.

In California.—Diaphorus, Thalpius, Lachnophorus, Casnonia, Axinopalpus, Pasimachus? Ligyrus, Cremastochilus, Diplotaxis, Dichelonycha, Perothops, Monocrepidius, Melanactes, Nosoderma, Blapstinus, Tetraopes, Chlamys, Saxinis, Diabrotica, Microrhopala.

A remarkable fact is again to be noticed in connection with the genera mentioned as found in the Atlantic States: the majority of them are found within the tropics. The only exceptions thus far are: Haplochile, Thalpius, Axinopalpus, Epiphanis, Perothops, Asaphes, Melanactes, Desmocerus.

DESCRIPTION OF NEW SPECIES.

Harpalus impotens, piceo-niger, oblongus, thorace transverso, lateribus rotundatis, margine angusto reflexo, angulis posticis rotundatis, basi utrinque vage foveato, versus angulos subdepresso, elytris ad marginem subtiliter pubescentibus, striatis, striis 2, 5, 7 parce punctatis, interstitiis fere planis, epipleuris ano pedibusque piceis, antennis palpisque rufo-piceis. Long. .38.

A specimen found at El Paso by Dr. T. H. Webb, of the Boundary Commission. This species is narrower than *H. (Selenophorus) stigmatus*, and *iripennis*, and readily recognized by the rounded angles of the thorax, and the smaller elytral punctures.

Pasimachus validus, niger nitidus, margine vix cyanescente, mandibulis rugosis, thorace transverso postice angustato, lateribus anguste marginatis ad basin sinuatis, angulis posticis rectis; elytris ovatis postice acutis, lateribus parum rotundatis, humeris obtusis (præcipue distinctis) subrotundatis, et breviter carinatis, dorso convexis, antice præcipue depressiusculis, sæpe seriatim punctulatis, (seriebus per paria approximatis;) tarsis posticis tibiis haud longioribus. Long. 1.12—1.43. Tab. IV. fig. 10.

Pasimachus punctulatus† Lec. Ann. Lyc. Nat. Hist. New York, 4, 146; tab. 7, fig. 3.

Kansas, Texas, Arizona; abundant. Having a numerous series of specimens before me, I am led to believe that the characters of this species are by no means constant, and it seems probable that the form of the elytra must be disregarded, and the very short humeral carina, and the comparative length of the posterior tarsi be considered alone as diagnostic. In this case the next species will appear as only an individual variety, although the differences in form are such that I can hardly believe it possible. The posterior tibiæ, on the inner surface below the middle, are in the male densely, in the female sparsely clothed with erect hairs. On account of this character, and its general resemblance to *P. depressus*, I was formerly led to believe this to be *P. punctulatus* Hald., but the type of that species has since been kindly presented to me, and on comparison I find them quite distinct; the humeral carina of *P. punctulatus* is longer and the margin is distinctly blue; it in fact differs from

P. depressus only by the mandibles and labrum being deeply rugous, and by the posterior tarsi being not longer than the tibiæ, while the latter in the male are densely pubescent on the inner surface.

P. corpulentus, niger nitidus, margine vix cyanescente, mandibulis vix rugosis, thorace transverso, postice angustato, lateribus postice breviter sinuatis, angulis posticis rectis, elytris rotundato-ovatis postice subacutis, lateribus valde rotundatis, humeris haud distinctis breviter carinatis, dorso æqualiter convexis, seriatim punctulatis (seriebus per paria approximatis); tarsis posticis tibiis haud longioribus. Long. 1.15.

Laredo to Ringgold Barracks, Texas, Mr. Weise; Sonora, Mr. Schott. Only differs from *P. validus* by the characters mentioned; and eventually perhaps to be considered as a race of that species.

P. costifer, niger nitidus, margine vix cyanescente, mandibulis rugosis, thorace transverso, postice angustato, lateribus rotundatis ad basin brevissime sinuatis, angulis posticis parvis rectis, elytris ovalibus antice subtruncatis, postice subacutis, lateribus late rotundatis, humeris haud distinctis carina mediocri, dorso æqualiter convexis, sæpissime seriatim punctulatis, (striis per paria approximatis, interstitiis sæpe alternatim parum elevatis) versus marginem uni- vel bicostatis; tarsis posticis tibiis haud longioribus. Long. 1.05-1.2. Tab. IV. fig. 11.

Lec. Proc. Acad. Nat. Sc. 7, 79.

Creek Boundary, Dr. S. W. Woodhouse; Laredo to Ringgold Barracks, and at Eagle Pass; Messrs. Schott, Weise and Haldeman. The sculpture of the elytra is very variable, but all transitions are found in the series before me, between those with one and those with two costæ, those with smooth elytra, and those with punctures in rows approximated by pairs, with the wider spaces more or less elevated.

One specimen, (.97 long.) in default of more information may be for the present placed here; it was collected by Dr. Webb in Arizona. The elytra are without any trace of costæ; the body is of a more slender form, being nearly as in *P. elongatus* Lec., but it differs from that species by the humeral carina being shorter, and making with the lateral margin an acute angle, while in *P. elongatus* the angle is rounded by the carina bending outwards so as to make a curve with the lateral margin. Although differing so much I think it more prudent to allow it to remain as a variety of *P. costifer*, until more specimens occur. Plate IV. fig. 11a represents an elytron.

P. obsoletus Lec., is nearly allied to *P. costifer*, but the inner intervals between the rows of punctures are more distinctly elevated, and the rows are single.

Agabus obsoletus, ellipticus, parum convexus æneo-niger, nitidus, conspicue reticulato-strigosus, thorace lateribus obliquis late rotundatis, cum elytrorum lateribus angulum haud formantibus, antennis pedibusque anterioribus piceo-rufis. Long. .33.

One male found at San Diego; differs from any other Californian species by its elliptical body and scarcely perceptibly reticulate surface: the shape is nearly that of *A. punctulatus* Aubé, but the sides of the thorax are less rounded, and consequently the approach to an elliptical form is nearer.

Aleochara valida, atra, capite thorace elytrisque opacis, profunde subtilius punctatis, pube brevi hispida indutis, thorace transverso rotundato, antice late subemarginato; elytris thorace haud longioribus, abdomine nitido parcius punctato, lateribus pilosello, ano sanguineo, antennis nigris pilosellis. Long. .19—.37. Tab. IV. fig. 16.

San Diego, California, under decomposing *Opuntia* stems. Of a dull black color, above finely granulate, without lustre except on the abdomen. Head sparsely punctured, thinly clothed with short suberect hair, obtusely pointed anteriorly, eyes oblong, not prominent; antennæ as long as the head and thorax, third joint a little longer than the second, fourth only half the length of the third, 5—10 transverse, gradually a little broader, sparsely pilose with verticillate hairs, 11th longer and narrower than the preceding, conical, obtusely rounded at tip. Thorax a little broader than long, transversely slightly convex, anteriorly broadly emarginate, sides and base curved with a circular outline, anterior angles rounded, slightly deflexed, finely not densely punctured, covered with short erect black hair. Elytra shorter than the thorax, punctured and hairy like it, flattened, truncate with the outer angle rectangular and rounded. Abdomen above shining, sparsely pubescent and punctured, parallel on the sides, obtusely rounded at the tip; anterior segments transversely impressed and smooth towards the base; sides strongly reflexed, pilose with longer black hairs: anus sanguineous. Body beneath densely punctured and pubescent with blackish brown hair.

Varies much in size, but usually larger than any other species of the genus and having a peculiar habit. I was at first inclined to regard it as a new genus, but after a patient examination and dissection I failed to find any character by which it might be separated.

Canthon vigilans, rotundato-ovalis, parum convexus, ater opacus vix ænescens, clypeo subtilius granulosus antice bidentato, sinibus ocularibus latiusculis; thorace lateribus angulatis, margine ante medium, inferne interrupto, et tuberculo minuto prædito; elytris obsolete striatis; fossulis pedum anticorum distinctis. Long. .67—.85.

Texas, Georgia, Missouri: Precisely like *C. lævis*, and *chalcites* in general appearance. The granulation of the surface is finer than in the first, but much coarser than in the second; and it differs from both species by the greater breadth of the portion of the eye which is seen in the clypeus.

Cremastochilus saucius, rufo-castaneus, nitidus, thorace transverso, angulis anticis auriculatis, posticis incis et retrorsum acuminato-productis, disco ad angulos anticos breviter, intra posticos longe exarato, parte mediana æqualiter subtilius punctata, lateralibus incrassatis, convexis lævibus, extrorsum punctatis; elytris punctis elongatis sat densis insculptis; pygidio punctato, subcarinato: mento parum concavo, margine postico subangulato, haud inciso. Long. .42.

Lodge Pole Creek, (Nebraska,) Mr. W. Wood; Llano Estacado, Capt. Pope. Readily known by the remarkable form of the thorax, the surface of which is divided into three lobes by the meeting of the long posterior, and the short anterior excavations,

which commence immediately at the respective angles. It belongs with the other Western species to the division *Psilocnemis* *Burm.*

C. squamulosus, piceo-niger confertim punctatus, punctis squamulis pallidis minutis notatis, thorace lateribus subangulatis, angulis anticis mammillaribus, haud prominulis, fovea magna interna rotundata signatis, angulis posticis parvis rectis sulco circumdatis, dorso subcanaliculato, ad basin depresso; mento valde concavo, postice anguste inciso. Long. .40.

Florida, Baron R. Osten Sacken. Nearest in appearance to *C. canaliculatus*, but smaller, with the fovea at the anterior angles of the thorax larger, and the punctures smaller. The scales of the punctures both on the thorax and elytra readily distinguish it. The incision of the mentum is narrow.

THRINCOPYGE Lec.

T. alacris, elongato-oblonga, læte viridi-ænea nitida, capite grosse rugose punctato, fronte inaurata, thorace latitudine brevior antrorsum latior, et transversim valde convexo, angulis anticis rotundatis, lateribus subrectis, basi utrinque recta obliqua, angulis posticis obtusis, parce subtiliter punctato, ante basin transversim impresso, margine laterali guttis ad apicem pluribus læte flavis; elytris fortiter marginatis, lateribus subsinuatis, postice oblique angustatis, ad apicem truncatis, striato-punctatis, striis postice exaratis, interstitiis lævibus, macula antice transversa in marginem ad humerum extensa, altera majore ad medium, tertiaque postica elongata læte flavis; coxis posticis macula flava ornatis. Long. .8. Variat elytrorum maculis plus minus deficientibus, antica sæpe divisa.

One specimen, Arizona, Mr. Schott. Numerous specimens from New Mexico were brought by Capt. Pope. Congeneric with *Buprestis ambiens* *Lec.*, and having somewhat the form of *Agrius*, though apparently related to *Ancylochira*. Antennæ shining, joints 3—6 successively wider, 7—11 triangular, with pores on the inferior edge. The labrum is small; the antennæ distant, inserted in small foveæ; the mandibles carinated, acute; the mentum closely united to the ligula, transverse, truncate, convex, entirely corneous. The sterna are not sulcate, mesosternum divided for only half its length. Legs unarmed, tarsi with broad equal joints, fifth depressed with widely divergent ungues. Scutellum small triangular. The fifth ventral segment of the abdomen is marked with a deep marginal groove around its posterior half; the groove each side ends suddenly in a small yellow spot. I cannot refer these species to any previously described genus.

Telephorus planicollis, fusco-niger, tenuiter parce pubescens, capite ante oculos pallido, thorace pallido, vitta dorsali fusca, latitudine fere duplo brevior, parum convexo, lævi subinæquali undique anguste marginato, elytris thorace haud latioribus minus subtiliter scabris. Long. .33.

One specimen, May 29th, Capt. Pope. Belongs to my division a. (*Proc. Acad.* 5, 340,) the outer claw of the posterior tarsi being armed with a large tooth: the thorax is comparatively less convex than usual, and the discoidal impressions are very vague: the reflexed margin is narrow, and equal at the sides, at the apex and the base; the 2nd joint of the antennæ is one third the size of the first or third which are equal. The head and thorax are pale beneath, but the legs and trunk are entirely black.

Trichodes bibalteatus, elongatus, rufo-pilosus, supra dilute rubidus, capite thoraceque longius villosis, clytris grosse confertim punctatis, fascia ante medium alteraque latiore ad dodrantem nigris; subtus niger antennis rufis clava fusca. Long. .63.

One specimen, Texas, Mr. Ulke. Related to *T. apivorus*, but narrower, and with no apical black spot on the elytra; the hair is also different in color, being reddish, while in *T. apivorus* it is black.

Microschatia sulcipennis, ovalis, convexa, atra opaca, thorace parce punctato antrorsum angustato, lateribus rotundatis marginatis, ad basin late rotundato utrinque sinuato, angulis posticis paulo productis subrectis, elytris sutura costisque utrinque 5 elevatis, 1ma 3iaque postice confluentibus 2nda 4taque utrinque abbreviatis, hac cum 3ia postice connexa, sulcis punctis quadratis magnis cribratis. Long. .60.

One specimen, Llano Estacado, Capt. Pope. The mentum is large, leaving between its sides and the mandibles only room for the palpi; the antennæ are stout, with the last joint very small, and the tarsi are thick, thus agreeing in generic characters with *M. inæqualis*. The prosternum is also broad and slightly produced as in that species. The abdomen is sparsely and not coarsely punctured.

PHILOLITHUS Lac.

In advance of the publication of the fifth volume of his work on the genera of Coleoptera, Prof. Lacordaire has sent me his description of the characters of this new genus, which contains all the species described by me as *Pelecyporus*. Though agreeing with that genus in the form of the mentum, which leaves a free space each side, more than sufficient for the movement of the palpi, it differs in the anterior tibiæ not being produced into a spine at the outer apical angle. Such at least is the only distinct difference noted in Prof. Lacordaire's description, and the only one that I have found in comparing specimens of *Pelecyporus mexicanus* Sol., kindly sent me by Mr. Sallé. An unnamed Mexican species, related by form and sculpture to *P. mexicanus*, also sent me by Mr. Sallé, does not show any trace of this spine, while in *P. confluens*, *hirsutus*, and especially in *P. rimatus*, this spine, or rather prolongation of the apical angle is quite distinct. Under these circumstances, though I have adopted the genus proposed by my learned friend, I am greatly in doubt whether it will not be necessary to recombine it again with *Pelecyporus*, the species of which being numerous and very different in form, may be divided into several natural groups, according to the form of the antennæ and tarsi, and the sculpture of the elytra.

The table of the relation of genera of Asidites, as sent me by Prof. Lacordaire is as follows:

I. Antennæ 11-articulate; maxillæ rarely visible.

a. Anterior tibiæ cylindrical: the apical external angle not prominent.

b. Mandibles separated from the submentum by a distinct interval.

Base of elytra emarginate in the arc of a circle

Microschatia.

Base of elytra truncate or sinuate	<i>Philolithus</i> .
<i>bb.</i> Mandibles and submentum contiguous	<i>Ologlyptus (Stenorides)</i> .
<i>aa.</i> Anterior tibiæ compressed with the apical external angle prominent.	
Posterior angles of thorax distinct.	<i>Pelecyphorus, Asida.</i>
Posterior angles not distinct	<i>Euschides.</i>
II. Antennæ 10-articulate: maxillæ visible in part.	
Tibiæ compressed, dentate	<i>Cardigenius.</i>
Tibiæ rounded, mutic	<i>Scotinus.</i>

Taking the division with 11-articulate antennæ, it appears to me that a more natural relation between our native genera is expressed as follows:

- A. Mentum filling the emargination of the gula.
- a. Last joint of maxillary palpi moderately dilated: mentum and mandibles approximate, leaving room only for the palpi.
- Base of elytra truncate, inflexed portion broad.
- Prosternum prominent, outer apical angle of anterior tibiæ prolonged *Astrotus Lec.*
- Prosternum not prominent, anterior tibiæ truncate *Pactostoma Lec.*
- Base of elytra emarginate, inflexed portion narrow *Microschatia Sol.*
- b. Last joint of maxillary palpi very large: mentum and mandibles separated by a moderately wide space: inflexed portion of the elytra wide *Pelecyphorus Sol.*
- B. A distinct fissure between the sides of the mentum and the gula: last joint of maxillary palpi very large: inflexed portion of elytra wide *Euschides Lec.*

The type of *Astrotus* is *Microschatia contorta Lec.*; and of *Pactostoma* is *Asida anastomosis Say*.

Pelecyphorus æger, piceo-niger, subnitidus, thorace latitudine duplo brevior, antice posticeque angustato, lateribus valde rotundatis depressis transversim rugosis, disco parce punctato, ad basin late emarginato, angulis posticis subacutis, elytris ovatis convexis postice valde declivibus, sutura, costis dorsalibus duabus ante apicem confluentibus margineque elevatis obtusis interstitiis inæqualibus haud punctatis: subtus parce punctatus, epipleuris inæqualibus impunctatis. Long. .75.

Llano Estacado, Capt. Pope. Closely related to *P. sordidus Lec.*, but differs by the disc of the thorax being only distantly punctured, while in that species the punctures are large, close and confluent. The under surface is likewise less densely punctured, and the epipleuræ are almost entirely free from punctures. The costæ of the elytra are broader and obtuse.

Pelecyphorus irregularis, piceo-niger nitidus, thorace latitudine plus duplo brevior, antice angustato, lateribus rotundatis depressis transversim rugosis, disco sat dense punctato, ad basin late vix emarginato, angulis posticis subacutis, elytris ovatis convexis postice valde declivibus, sutura costis duabus ante apicem confluentibus margineque elevatis, interstitiis valde inæqualibus, impunctatis; subtus punctatus, epipleuris punctis paucis notatis. Long. .81.

Llano Estacado, Capt. Pope. Also related to *P. sordidus*, but the sides of the thorax are less rounded, the base is hardly narrowed, and the disc is less densely, less coarsely and not confluently punctured.

Pelecyporus costipennis, piceo-niger, sordidus, opacus, thorace latitudine plus duplo brevior, lateribus valde rotundatis depressis, undique dense grosse confluentur punctato, ad basin late emarginato angulis posticis productis acutis, elytris breviter ovatis convexis, postice valde declivibus, sutura costis duabus ante apicem confluentibus margineque valde elevatis, interstitiis valde inæqualibus, epipleuris parce, punctatis, abdomine dense punctato. Long. .60—.80.

Arizona, Dr. Webb. Also related to *P. sordidus*, but the thorax is comparatively larger, with the posterior angles more elongated and acute. The elytra are wider, with the costæ more elevated.

Eusattus productus, subcylindrico-ovalis, postice acutus, niger, thorace elytris latiore brevi modice convexo, vix subtilissime punctulato, postice valde bisinuato, angulis posticis acutis, lateribus fortiter depresso-marginatis, elytris inordinatim parcius muricato-punctatis, tibiis anticis serrulatis, angulo externo parum producto. Long. .44—.52.

Arizona, Mr. Schott. Comparatively narrower than *E. dubius* Lec., much larger, with less convex and scarcely punctured thorax, and more distinctly punctured elytra; the latter exhibit a faint tendency to become sulcate, and the punctures are very obviously muricate: they are nearly parallel on the sides for three-fourths of their length, then narrowed obliquely to the apex which thus appears nearly acute.

Embaphion contusum, atrum opacum, thorace latitudine fere duplo latiore, antice profunde emarginato, lateribus valde rotundatis, disco parum convexo, parce punctato, margine lato explanato modice reflexo, angulis anticis subacutis, posticis latis obtusis valde rotundatis, basi media recte truncata, elytris dorso planis, postice valde declivibus, et acute angustatis, thorace vix latioribus fortiter reflexo-marginatis seriatim subtilius sat dense muricato-punctatis, ad apicem singulatim breviter acuminatis (♀) vel in cauda brevi prolongatis (♂). Long. .55—.65.

Fort Laramie and Santa Fe. Though differing very much in form from the *Helæus*-like *E. muricatum* Say, the form of the antennæ, oral organs and legs require it to be associated in the same genus with that species.

Two specimens brought by Dr. Thos. H. Webb from Arizona differ in having the side of the thorax much more strongly reflexed, so that that part becomes considerably narrower than the elytra. This is probably merely an individual variation, as similar differences occur in *Cychrus elevatus*, as in many other insects in which the margins of the body are widely reflexed.

Rhipiphorus puncticeps, niger capite dense punctato, occipite obtuse rotundato, thorace rufo scabro-punctato, lobo scutellari ad apicem impresso, elytris confertim grosse punctatis introrsum late impressis, testaceis, puncto humerali, gutta ad medium apiceque nigris, abdomine sanguineo; antennis rufis extrorsum fuscis. Long. .35—.40.

Three specimens agreeing in color, from Llano Estacado, Capt. Pope. Differs from our common, much varying species, called *R. varicolor* by Gerstæcker, (but which should rather be named *R. pectinatus* Fabr., that being the earliest name given to the species,) but differs by the head being uniformly densely punctured, by the an-

terior face of the occiput being a little flattened, and by the posterior margin being more broadly margined.

R. bicolor Say, placed as a synonym to *varicolor* by Gerstæcker, differs very much by the anterior face of the vertex being flattened, and the posterior so broadly rounded as to appear almost truncate, as noted by Say in his descriptions. Dr. Melsheimer considering the name *bicolor* as preoccupied by Olivier, substituted *R. ambiguus*, but described under that name a variety of *R. pectinatus*. Under these circumstances, in view of the fact that the name *bicolor* was preoccupied at the time of the description by Say, I have changed the name to *R. Sayi*, and although more recently Gerstæcker has placed Olivier's species as a synonym of *R. bimaculatus*, this does not obviate the necessity of removing the name which was imposed by Say under a misapprehension.

EUPOMPHA Lec.

Oculi subovati, obliqui integri; antennæ inter oculos antice insertæ, sublaxe articulatae, filiformes, capite thoraceque parum longiores, articulo 1mo obconico, crasso, sequentibus duobus brevioribus, 2do parvo, 3io sequente longiore: palpi breves compressi. Tibiæ anticæ extrorsum bisinuatae, posticæ paulo incurvatae; hæ calcaribus brevibus, interno acuto, externo obtuso; tarsi posteriores compressi subtus biseriatim pubescentes, antici (maris?) articulis tribus dilatatis, inflatis supra concavis, subtus dense pubescentibus; ungues fissi, parte inferiore paulo brevioribus. Corpus alatum, elytris integris.

A very singular genus related to *Lytta* and *Phodaga* Lec., but sufficiently distinct from the first by the entire eyes, placed obliquely and not transversely, and from the second by the tarsi not being spinose beneath. The form is long and slender as in *Lytta polita* Say. The anterior thighs are not sinuate beneath near the tip, and have no dense pubescence at that place.

Eu. fissiceps, capite rufo profunde sulcato, ore fusco, thorace elytrisq. cyaneo-viridibus, ænescentibus, illo nitido parce punctato, campanulato, canaliculato, dorso antice posticeque transversim impresso, elytris lineis elevatis confertis reticulatis; subtus viridi-cyanea, pedibus rufis coxis, trochanteribus femoribusque ad basin nigris, antennis brevibus filiformibus, fuscis, articulis tribus primis rufis. Long. .76.

Mas tarsis anticis articulis tribus dilatatis, inflatis, supra concavis.

One specimen collected by Capt. Pope, probable on the Llano Estacado.

Lytta corvina, atra, opaca, subtiliter nigro-pubescent, capite thoraceque confertissime punctatis, hoc rotundatim quadrato, latitudine paulo brevioribus, elytris thorace latioribus subtiliter dense punctulatis; labro modice emarginato; clypeo margine antico piceo-testaceo. Long. .80—.98.

Arizona, Dr. Webb: Llano Estacado, Capt. Pope. Resembles *L. fissilabris* Lec., but is much larger, somewhat stouter, with the thorax broader than long, and the labrum less deeply, though still considerably emarginate. The second joint of the antennæ is small; the first is a little shorter than the third.

Lytta insulata, nigra, capite thoraceque flavis, parce grosse punctatis, ore guttis pluribus, lateribusque pone oculos nigris, thorace latitudine longiore, antrosum sensim angustato, gutta utrinque antica in latera, maculaque utrinque postica discoidali obliqua nigris, elytris testaceo-fuscis, opacis, alutaceis punctulatis, vitta basali abbreviata, margine laterali, maculaque subapicali pallide-flavis, ad apicem nigricantibus. Long. .77.

Mas antennis ad articulo 2ndo geniculatis, palpis maxillaribus articulo ultimo magno elliptico, subtus concavo, patelliformi.

One specimen, collected May 10th, by Capt. Pope, on the route to Llano Estacado. This species belongs with *L. mylabrina*, &c., to my division B—e, (Proc. Acad. 6, 331); and the male of the latter species, as I have recently ascertained possesses similar sexual characters, though the dilated last joint of the maxillary palpi is more ovate, and is not so concave beneath. I have not seen males of *L. Germari*, and do not know whether they are similarly provided.

It is also to be noted that in the male of *L. mylabrina*, the antennæ besides being suddenly geniculated between the first and second joints are less slender than in the female.

Connected closely with *L. mylabrina*, are two forms to be here noticed; the first was collected by Capt. Pope on the Llano Estacado. It is .45—.55 long, sculptured, colored and spotted as in *L. mylabrina*, except that the lateral spots of the thorax are wanting, the two discoidal ones alone being present: the elytra are shining, less densely and more distinctly punctured. Sexual characters as above: first joint of the antennæ usually testaceous, or spotted, rarely entirely black.

The second form is found in Texas and New Mexico, was collected by Mr. Schott, and Capt. Pope. It is .7—.9 long, sculptured, colored and spotted, as in *L. mylabrina*, except that the elytra have only the two basal spots on each, and a large quadrate black blotch behind the middle extending from the suture almost to the margin, and corresponding to the medial transverse band of *L. mylabrina*; the apical black band is entirely wanting. The first joint of the antennæ is testaceous. All these forms vary greatly in the color of the under surface, and seem to present the phenomenon of races, and lead to the conclusion that *L. Engelmanni* Lec., will eventually be ranked with them under *L. mylabrina*.

Lytta vittigera, sordide rufa, capite thoraceque nitidis parce punctatis, hoc latitudine longiore, antrosum sensim angustato, macula utrinque antica in latera, alteraque postica discoidali nigris, elytris dense subtiliter punctulatis, subtiliter 4-lineatis, vitta lata nigra a humero fere ad apicem extensa; subtus nigra suturis rufis, femoribus basin, trochanteribusque testaceis. Long. .82.

Near the boundary of Texas. Dr. Berlandière; two females. Belongs to the same group as *L. mylabrina*, and probably varies equally in the size of the black spots of the under surface. One specimen, besides the black stripe of the elytra, has a black spot near the scutellum, but in the other it is hardly visible. It is nearly related to *L. discoidea* Lec., but is very much larger, and has the elytra much more densely

punctured, and the legs differently colored. In the species last mentioned the sexual characters are as in *L. mylabrina*, but less strongly developed: the dilated joint of the maxillary palpi is narrowed, slightly trapezoidal, and flattened beneath.

Lytta tenella, nigro fusca, undique pube cinerea pruinosa, vix punctulata, capite antennis pedibusque rufo-testaceis, illo linea longitudinali glabro, thorace latitudine paulo longiore, campanulato, rufo-testaceo, nonnunquam nigricante. Long. .46.

Llano Estacado, July 4th, Capt. Pope. Belongs to group B—g, with *L. pennsylvanica*, *maculata*, &c., from all of which it differs much by the color. The outer spur of the anterior tibiæ is a little broader than the inner one, and obtuse.

Lytta linearis, elongata nigra, pube cinerea densissime vestita thorace latitudine longiore subcampanulato, labro vix emarginato, antennis articulis 2 et 3 brevibus (hoc tamen longiore) conjunctis 4to vix longioribus. Long. .46.

One specimen, August 4th, Llano Estacado, Capt. Pope. In form resembles our common *L. Fabricii* Lec., (*cinerea*|| Fabr.), but differs from it and from all others known to me by the proportion of the 2nd and 3rd joints of the antennæ. The joints after the 4th are equal in length, moderately closely articulated, slightly diminishing in breadth: the 2nd and 3rd joints together are a little longer than the 4th, and the 3rd is a little longer than the 2nd: the first joint is a little longer than the 2nd and 3rd together. The spurs of the posterior tibiæ are slender and acute. For present convenience this species may be placed in B—g, near *L. lemniscata*.

Lytta costata Lec., was also collected by Capt. Pope in considerable numbers, and I am therefore enabled to note on the present occasion the sexual characters. In the male the first articulation of the antennæ extends behind the eyes, and is slender; the 2nd is two-thirds as long as the 1st: the 3rd is double the length of the 2nd: the 4th and 5th are similar to the 3rd; the remaining joints are equal, and individually only one-third the length of the 5th. In the female the 1st and 3rd joints are equal, the 2nd less than two-thirds of the length; the 4th and 5th are equal to the 2nd, and the following ones about two-thirds the length of the 5th.

I stated (Proc. 7, 84) that the species might enter group B—g, but the above mentioned sexual characters would seem to indicate the propriety of establishing another group B—g'. for its reception.

Nemognatha flavicollis, nigra, capite nitido parce punctato, elongato, vertice sublævi, thorace conico flavo nitido, punctis paucis notato, elytris thorace duplo latioribus, fortiter haud dense punctatis, piceis postice ad suturam pallidioribus, pube brevi nigra erecta vestitis: mandibulis elongatis, antennis extrorsum sensim incrassatis; maxillis pallidis corpore duplo brevioribus. Long. .17.

One specimen, Texas, Mr. Ulke. This species belongs with *N. longicollis* Lec., to the group named *Gnathium* by Kirby. It differs from that species both in size, color and sculpture.

Eburia manca, fusca, subtiliter cinereo-pubescent, thorace rude punctato, latitudine paulo longiore, lateribus vix rotundatis tuberculo parvo acuto armatis, callis rotundatis 4 ante medium nitidis (externis in latera sitis), elytris sat dense punctatis, callo parvo basali, alteraque ad medium eburneis nitidis, ad apicem subtruncatis spina brevi suturali armatis, femoribus apice muticis. Long. .66.

Ringgold Barracks, Texas, Mr. Haldeman. Closely resembles *E. mutica* Lec., but the thorax is narrower and the lateral tubercle is more distinct, the ivory spots of the elytra are single, and the suture is slightly produced into a spine.

AMANNUS Lec.

Antennæ 11-articulatæ, filiformes, maris corpore longiores, feminae breviores, articulo 3io paulo longiore. Palpi breves æquales, compressi: mentum transversum, trapezoideum; mandibulæ integræ acutæ. Oculi subtiliter granulati. Thorax subcylindricus, antice paulo angustatus, nec apice nec basi marginatus. Elytra apice subrotundata. Pedes haud elongati, femora gracilia haud clavata; tarsi postici articulo 1mo sequentibus duobus longiore.

A genus distinguished rather by the want of any prominent character, and which will very likely fall into some previously established by other authors, but which from the imperfect method of description used cannot be identified with satisfaction.

It belongs to the numerous group V. of my arrangement, (Journ. Acad. 2nd ser. 2, 7,) which is known by the round dehiscent anterior acetabula, acute mandibles, flat mesosternum, simple not clavate thighs, compressed palpi and very short front. The genera have been increased since the writing of my paper, and renewed investigation having revealed some other characters, the following table, in advance of a full supplement to my memoir, may be found useful.

A. Oculi rude granulati.	<i>Eburia</i> , including <i>Cerasphorus</i> ; <i>Elaphidion</i> .
B. Oculi subtiliter granulati, (thorax haud armatus).	
Antennæ articulis spina apicali armatis	<i>Stenosphenus</i> .
Antennæ muticæ.	
Thorax basi apiceque marginatus;	
margine apicali valde prominulo.	<i>Mannophorus</i> .
margine apicali medioeri	<i>Eriphus</i> .
Thorax nec basi nec apice marginatus	<i>Amannus</i> .
Thorax basi sola marginatus	<i>Arhopalus</i> .

I have removed *Purpuricenus* and *Tragidion* from the group, because the front is more elongated.

A. vittiger, niger, capite thoraceque dense pallide pubescentibus, hoc antrorsum subangustato lateribus late rotundatis, punctato, callo obsoleto dorsali lævi, elytris pallide flavis, vitta dorsali angusta antice parum abbreviata nigra, sutura margineque nigricantibus, confertim punctatis, pubescentibus, obsolete bicostatis, apice late haud subito truncatis; subtus dense pallide pubescens, abdomine fasciis nudis nitidis notato. Long. .43.

One specimen Llano Estacado, Capt. Pope. Has somewhat the appearance of *Sphe-nothecus*. The specimen is a female, with the antennæ two-thirds the length of the body.

A. pectoralis, niger, capite piceo-variegato, thorace cylindrico (pubescente?) parce subtiliter punctato, elytris confertim punctatis subtiliter pubescentibus vitta subsuturali testacea postice infusca, margine laterali fuliginoso, apice singulatim late rotundatis pone medium obsolete bicostatis; subtus testaceus, postpectore nigro, pedibus nigris, femoribus basi testaceis, antennis piceis basi nigris. Long. .27.

A dead specimen found by me at Fort Yuma, California. From some remains of pubescence at the sides I am disposed to believe that the thorax was hairy as in *A. vittiger*; the abdomen is similarly marked with transverse shining bands.

Stenaspis solitaria. A beautiful variety of this species having the head, thorax and anterior portion of the elytra of a dull red color was found by Capt. Pope in the valley of the Rio Grande.

Sphenothecus suturalis, niger supra tenuiter albo-pubescent, thorace obscure rubro, parce grosse punctato, callo parvo dorsali lævi, puncto basali, margineque postico albo-pubescente, scutello elytrorumque sutura dense albo-pubescente, his punctatis, ad apicem sinuatim emarginatis angulo externo dentigero; subtus dense pubescens, femoribus rufis. Long. .52.

Very distinct from the other two species. Found by Capt. Pope in the valley of the Rio Grande.

Tylosis sellatus, niger, dense cinereo-pubescent, thorace elytrisq. coccineis, tenuiter pubescentibus, illo grosse sat dense punctato, margine antice callisque 5 elevatis nitidis nigris, elytris antice grosse, postice confertim subtiliter punctatis, ad apicem rotundatis, macula subscutellari, altera humerali plagaque communi maxima a quadrante fere ad apicem extensa lateribus profunde sinuata ornatis. Long. .68.

One specimen, Llano Estacado, Capt. Pope. More slender than *T. maculatus*, with the apex of the elytra less broadly rounded.

Crossidius humeralis, sordide luteus, pubescens, thorace rotundato, longius pubescente, rude punctato, callis parvis duobus notato, elytris dense punctatis, vix obsolete bicostatis, linea brevi humerali nigra ornatis; subtus obscurus, densissime pubescens. Long. .48—65.

Llano Estacado, August, Capt. Pope. Resembles in appearance *C. testaceus*, but the elytra are more finely and densely punctured, and the elevated lines can be scarcely observed: the sides of the thorax are rounded without any trace of a lateral tubercle.

Tragidion armatum, nigrum, breviter pubescens, capite vix cornuto, thorace latitudine brevior, confertim punctato, callo dorsali postico lævi, lateribus spina magna armatis, elytris fulvis, margine basali infusca, haud costatis, antennis articulis 3-7 testaceis ad apicem plus minusve infuscatis. Long. .80—1.0.

Llano Estacado, Capt. Pope. Stouter than the other two species, and proportioned nearly as *Purpuricenus*: the hairs of the head and thorax are shorter, the lateral spine of the thorax much larger, and the elytra uniformly convex, not at all sulcate. The anterior tibiæ are sometimes testaceous at the base. The prominences between the antennæ, even in the male, are less conspicuous than in the other species, and the first joint of the antennæ is comparatively less thickened.

Clytus irroratus, niger, pube subtili cinerea irroratus, thorace latitudine haud brevior, lateribus bene rotundatis, rude punctato, dorso longitudinaliter subelevato, tuberculis paucis transversis notato, utrinque subplanato, elytris fusco-testaceis, subtilius dense rugosis, plagis nigricantibus, lineolisque angulatis cinereo-pubescentibus variegatis, ad apicem singulatim acuminatis femoribus apice bispinis. Long. .5—.75.

Texas, Mr. Haldeman. Resembles in color and markings *C. nauticus*, but differs very much by the thorax being regularly rounded on the sides, and the femora with two terminal spines as in *C. luscus*, &c. The scutellum is covered with dense white pubescence, divided by a black line. The cinereous angulated lines of the elytra are very indistinct. The antennæ are thickened externally.

Tetraopes discoides, niger, undique cinereo-pubescent et nigro-pilosus, thorace lateribus parum sinuatis, medio subito sed haud alte elevato, guttis 4 nigerrimis notato, apice et basi coccineo, elytris basi lateribus et ramo ad medium laterali obliquo coccineis, mox pone ramo macula utrinque nigrissima notatis; antennis nigris haud annulatis. Long. .32.

Llano Estacado, Capt. Pope. Remarkably distinct from all other species by the black head. It is more nearly allied to *T. umbonatus* Lec. than any other, and its marking may be conceived to be derived from the design of that species by extending the black over the greater part of the thorax, and enlarging the anterior black blotch of the elytra so that it unites with the posterior one, as in some varieties of *T. canteriator*.

Euryscopa aeneipennis, æneo-nigra, undique dense cinereo-pubescent, thorace latitudine haud brevior, lateribus rectis, confertim punctato, linea dorsali obsoleta, elytris viridiæneis glabris, fortiter seriatim punctatis, seriebus versus basin introrsum confusis, lobis humeralibus majusculis pubescentibus; antennarum articulo 3io 4to paulo minore. Long. .26—.33.

Llano Estacado, Capt. Pope. Belongs to Lacordaire's Division IV. (Col. Phytoph. 2, 506.)

Euryscopa vittata, nigra, subtus dense cinereo-pubescent, capite dense, thorace ad latera modice pubescentibus, hoc latitudine brevior, lateribus subrotundatis, medio parce subtiliter lateribus distincte punctato, elytris seriatim punctatis vitta lata rubra a humero longe ultra medium extensa. Long. .29.

One male, Llano Estacado, Capt. Pope. Seems related to the Mexican *Eu. Pilatei* and *scapularis* Lac., but differs by the longer elytral vitta: it covers entirely the lobe of the epipleuræ, but leaves the humeral callus black.

Doryphora Rogersii, rotundata valde convexa, nigro-cyanea, thorace minus dense punctato, subtilius in medio, lateribus rotundatis, postice subparallelis, elytris aurantiacis, seriatim punctatis, seriebus per paria approximatis, externis confusis, macula magna humerali, alterisque pluribus parvis nigris. Long. .32—.47.

Platte River, Nebraska: Llano Estacado, Capt. Pope. Related to *D. trimaculata*, but apart from the markings of the elytra, it differs by the sides of the thorax being nearly parallel posteriorly, so that the base is not at all narrowed as in that species. The spots on the elytra are variable in size, and the two middle ones are sometimes confluent. They are placed: on each, two small ones near the base, and

a large humeral one; then two at the middle near the suture, sometimes confluent; then three, the outer one near the margin, the inner ones usually confluent, and about one-third from the suture and one-third from the tip; finally a small dot near the lateral margin, about one-fifth from the tip; the suture is dark brown, nearly black.

I dedicate this species to the memory of my lamented and highly esteemed friend W. F. Rogers, whose synopsis of the Chrysomelæ of the U. S. (Pr. Acad. 8, 29) gave evidence of ability and usefulness, which has been lost to science by his untimely death.

Haltica pluriligata, pallide flava elongata, thorace latitudine sesqui brevior fere obsolete punctulato, guttis nigris quatuor lineolaque media versus basin ornato, lateribus marginatis rotundatis, elytris subtiliter parce punctulatis, sutura, vitta discoidea apicem haud attingente, alteraque juxta marginem nigris; tibiis apice, tarsisque fuscis, antennis nigro-piceis, articulis tribus flavis, supra infuscatis. Long. .32.

Kansas and Texas. Allied to *A. alternata*, but narrower, and with a less transverse thorax.

Haltica torquata, elongata, thorace punctulato, ad basin late rotundato, ante basin profunde transversim sulcato, plus minusve cupreo, elytris chalybeis, purpureo-micantibus, confertim punctulatis, margine tenui epipleuris cupreo-æneis; subtus obscure ænea, pedibus purpureo-chalybeis. Long. .2.

Santa Fe, New Mexico, Messrs. Fendler and R. C. Kern: Fort Yuma. An elongate Graptodera, readily distinguished from the other species resembling it, by the color and fine dense punctuation of the elytra.

LIST OF SPECIES.

CICINDELIDÆ.	
<i>Dromochorus Guérin.</i>	
Pilatei <i>Guérin</i> , Rev. Zool. 1846, tab.	Vittoria, Texas.
<i>Megacephala Latr.</i>	
carolina <i>Dej.</i> 1, 8.	Tex., Ar., Col.
<i>Cicindela carolina</i> Linn.	
<i>Megacephala carolinensis</i> Latr.	
<i>Cicindela</i> Linn.	
vulturina <i>Lec.</i> , Proc. Acad. 6, 439; Tr. Am. Phil. Soc. 11, 32.	Tex.
viatica <i>Chevr.</i> Col. Mex. 2nd cent.; Lec. ibid, 11, 62.	Ar.
latesignata <i>Lec.</i> , Ann. Lyc. 5, 172.	SD.
hirticollis <i>Say</i> , Tr. Am. Phil. Soc., 1, 20.	Fr. G. SD.
<i>Cicindela albohirta</i> Dej.	
<i>Cicindela grävada</i> Lec.	
tenuisignata <i>Lec.</i> , Ann. Lyc. 5, 171; Tr. Am. Phil. Soc. 11, 44.	Tex. Col.
Sauleyi <i>Guérin</i> , Rev. Zool. 1840, 37.	Tex.
<i>Cicindela venusta</i> Ferté, ibid, 1841, 37.	
cuprascens <i>Lec.</i> , Proc. Acad. 6, 65; Tr. Am. Phil. Soc. 11, 49.	Fr.
sperata <i>Lec.</i> , Tr. Am. Phil. Soc. 11, 50.	Tex. Fr.
<i>sigmoidea</i> <i>Lec.</i> , Ann. Lyc. 5, 172; Tr. Am. Phil. Soc. 11, 52.	
punctulata <i>Fabr.</i>	SD.
var. <i>micans</i> <i>Fabr.</i>	
decostigma <i>Chevr.</i> , Col. Mex. cent. 1; Lec. Tr. Am. Phil. Soc. 11, 54.	Tex.
hemorrhagica <i>Lec.</i> , Ann. Lyc. 5, 171; Tr. Am. Phil. Soc., 11, 54.	SD.
sedecimpunctata <i>Klug.</i> , Jahrb. 32; Lec. Tr. Am. Phil. Soc., 11, 56.	Fr. Ar.
<i>Cicindela rubriventris</i> <i>Chevr.</i>	
severa <i>Ferté</i> , Rev. Zool. 1841, 41; Lec. Tr. Am. Phil. Soc. 11, 58.	Tex., Tampico.
circumpicta, <i>Ferté</i> , ibid, 39, Lec. ibid. 58.	Tex.
<i>Cicindela Johnsonii</i> Fitch, Tr. N. Y. Ag. Soc., 1856, 487.	
prætextata <i>Lec.</i> , Proc. Acad. Nat. Sc. 7, 220; Tr. Am. Phil. Soc., 11, 58.	Ar.
togata <i>Ferté</i> , Rev. Zool., 1841, 40; Lec. l. c., 11, 58.	Tex.
lemniscata <i>Lec.</i> , Proc. Acad. Nat. Sci. 7, 220; Trans. Am. Phil. Soc. 11, 59.	Ar.

The following abbreviations of localities are employed:—Tex. Texas; Fr. Frontera: CM. Copper Mines: Ar. Arizona: Col. Colorado: Vall. Vallecitas: SI. Santa Isabel: SD. San Diego: G. Gila: Cal. California: Mx. Mexico: Kz. Kansas: LS. Lake Superior.

CARABIDÆ.

Brachinus Weber.

- Deyrollei* Ferté, Rev. Zool. 1841.....Tex.
 ? *Brachinus strenuus* Lec., Proc. Acad. 2, 48;
 Ann. Lyc., 4, 200.
glabripennis Lec.,.....G. SD.
Tschernikhii Mann., Bull. Mosc. 1843, 184.....SD.
puncticollis Lec.,.....Ar.
fidelis Lec.,.....Ar.
lateralis Dej., Sp. 5, 426.....Col. Tex.

Galerita Fabr.

- californica* Mann., Bull. Mosc. 1843, 183.....Ar.
atripes Lec., Pr. Acad. 1858, 59.....Tex. Kz.

Helluomorpha Lap.

- ferruginea* Lec., Trans. Am. Phil. Soc. 10, 373.....Tex.
texana Lec., ibid. 374.....Tex.

Lachnophorus Dej.

- elegantulus* Mann., Bull. Mosc. 1843, 215...G. Cal. Mex. Kz.

Ega Lap.

- lætula* Lec., Ann. Lyc. 5, 173.....Col.

Lebia Latr.

- grandis* Hentz., Trans. Am. Phil. Soc. 3, 53.....Tex.
ruficollis Lec., Ann. Lyc. 5, 178.....SD.
cyanipennis Dej., Sp. 5, 385.....SD.
furcata Lec., Ann. Lyc. 4, 193.....Col. LS. Kz.
guttula Lec., ibid. 5, 178.....Col.

Apristus Chaud.

- laticollis* Lec., Ann. Lyc. 5, 176.....SD.

Blechrus Motsch. (emend. Schaum).

- lucidus* Schaum, Ins. Deutschl. 1, 275.....Col.
Bomius lucidus Lec., Ann. Lyc. 5, 177.

Axinopalpus Lec.

- californicus* Lec., Ann. Lyc. 5, 175.....SD.
Dromius californicus Motsch. Bull. Mosc. 1845, 336.

Glycia Chaud.

- viridicollis* Lec., Trans. Am. Phil. Soc. 11, 379.... Tex. Kz.
Cymidis viridicollis Lec., Ann. Lyc. 4, 188.

Callida Dej.

- planulata* Lec., Proc. Acad. 1858, 59.....Tex.
cyanoptera Lec., ibid. 59.....Tex.

Cymindis Latr.

- punctigera* Lec.,.....Col.

Pinacodera Schaum.

- platicollis* Schaum, Ins. Deutschl. 1, 294.....Tex.
Cymindis platicollis Say.
Cymindis complanata Dej.
Lebia russata Newman.

Philotecnus Lec.

- croceicollis* Lec., Tr. Am. Phil. Soc. 10, 379.....SD.
Calleida croceicollis Ménétr., Bull. Mosc. 2, 53.
Philotecnus ruficollis Lec., Ann. Lyc. 5, 175.

Tachys Lec.

- obesulus* Lec., Ann. Lyc. 5, 192.....Ar.
elegantulus Ferté, Rev. Zool. 1841.....Tex.
rapax Lec., Ann. Lyc. 5, 192.....G.
audax Lec., Ann. Lyc. 5, 193.....Col.
vittiger Lec., Ann. Lyc. 5, 193.....SD.
marginellus Lec., Ann. Lyc. 5, 193.....Col.
corax Lec., Ann. Lyc. 5, 194.....Col.
mordax Lec., Ann. Lyc. 5, 193.....Col.
vorax Lec., Ann. Lyc. 5, 194.....Col. G.

Calathus Bon.

- ruficollis* Dej., Sp. 3, 78.....SD.
obscurus Lec., Proc. Acad. 7, 37.....SD.

Platynus Bon. (emend. Brullé.)

- bicolor* Lec., Proc. Acad. Nat. Sc. 7, 43.....SD.
funebis Lec., ibid. 7, 45.....SD.
extensicollis Lec., (races δ & ϵ) ibid. 7, 46.....Ar.
Feronia extensicollis Say.
simplex Lec., Proc. Acad. Nat. Sc. 7, 46.....Col.
decorus Lec., (race α) ibid. 7, 47.....G.
Feronia decora Say.
californicus Lec., Pr. Acad. 7, 47.....SD.
Anchomenus californicus Dej., Sp. 3, 128.
frater Lec., Proc. Acad. 7, 49.....SD.
cupripennis Lec., Pr. Acad. 7, 50.....Tex.
Feronia cupripennis Say.
punctiformis Lec., Pr. Acad. 7, 50.....Tex.
Feronia punctiformis Say.
Agonum rufipes Dej.
Agonum foveicolle Chaud.
subcordatus Lec., Pr. Acad. 7, 51.....Tex. Kz. LS.
 ? *Agonum erythropum* Kirby.
placidus Lec., Pr. Acad. 7, 55.....Tex.
Feronia placida Say.
Agonum morosum Dej.
maculicollis Lec., Pr. Acad. 7, 55.....SD.
Agonum maculicolle Dej.
fossiger Lec., Pr. Acad. 7, 56.....SD. C. l.
Agonum fossiger Dej.

Evarthrus Lec.

- Engelmanni* Lec., Journ. Acad. 2nd ser. 5, 228.....Tex.
substriatus Lec., ibid. 233.....Tex. Fr.
Feronia (Molops) substriata Lec., Ann. Lyc. 4, 344.
heros Lec.,.....Tex.
Feronia heros Say, Journ. Acad. 3, 145.
gravidus Hald., Pr. Acad. 6, 361.....Tex.

Pterostichus Bon. (emend. Er.)

- Isabellæ* Lec., Ann. Lyc. 5, 58; Journ. Acad. 2nd ser.
 2, 237.....SI.
congestus Lec.,.....SD.
Feronia congesta Ménétr. Bull. Petrop. 2, 59.
Pterostichus illustris Lec., Ann. Lyc. 5, 58; Journ.
 Acad. 2nd ser. 2, 237.
californicus Mann., Bull. Mosc. 1843, 199, (nec Lec.).....SD.
simplex Lec., Ann. Lyc. 5, 57; J. Ac. 2nd ser. 2, 238.
submarginatus Lec., Journ. Acad. 2nd ser. 2, 246.....Tex.
Feronia submarginata Say, Tr. Am. Phil. Soc. 2, 45.

Poecilus Bon.

- subcordatus* Lec., Ann. Lyc. 5, 37.....Col.

- Sayi Brullé*, Silb. Rev. Entom. 3, 277.....Tex.
Feronia chalcites Say, Tr. Am. Phil. Soc. 2, 56.
cursor Lec., Journ. Acad. 2nd ser. 2, 254.....SI.
Pæcilus cursorius Lec., Ann. Lyc. 5, 57.
- A m a r a Bon.
- Jacobina Lec.*, Proc. Acad. 7, 346.....SD.
insignis Dej., Sp. 5, 796.....SD.
californica Dej., Sp. 3, 474.....SD. Col. Ar.
aurata Dej., Sp. 3, 475.....SD.
- S t e n o m o r p h u s Dej.
- rufipes Lec.*, Proc. Acad. 1858, 59.....Tex.
- N o t h o p u s Lec.
- zabroides Lec.*, Proc. Acad. 6, 67.....Tex. Kz.
Euryderus zabroides Lec., Ann. Lyc. 4, 152.
- M e l a n o t u s Dej.
- erro Lec.*, Proc. Acad. 7, 221.....Ar.
- A n i s o d a c t y l u s Dej.
- piceus Lec.*, Tr. Am. Philos. Soc. 10, 383.....SD
Diplocheirus piceus Ménétr.
Dicheirus parallelus Lec.
rusticus Dej., Sp. Gen. 4, 157.....Tex.
Harpalus rusticus Say, Tr. Am. Phil. Soc. 2, 32.
ellepticus Lec., Ann. Lyc. 4, 334.....Tex.
brevicollis Lec., Ann. Lyc. 5, 183.....SI.
consobrinus Lec., Ann. Lyc. 5, 183.....SD.
baltimorensis Dej., Sp. Gen. 4, 152.....Tex.
Harpalus baltimorensis Say, Tr. Am. Phil. Soc. 2, 33.
- G y n a n d r o t a r s u s Férté.
- harpaloides Férté*, Ann. Ent. Soc. Fr. 1841, 203.....Tex.
- B r a d y c e l l u s Er.
- rupestris Lec.*.....Tex.
Trechus rupestris Say, Tr. Am. Phil. Soc. 2, 91.
Acupalpus elongatulus Dej., Sp. 4, 437.
Trechus flavipes Kirby, Fauna B. A. 4, 47.
nitens Lec., Proc. Acad. 1858, 60.....SD.
nubifer Lec., Proc. Acad. 1858, 60.....SD. Ar.
veicularis Lec., Proc. Acad. 1858, 61.....Ar.
rivalis Lec., Proc. Acad. 1858, 61.....Col.
- H a r p a l u s Latr.
- læsus Lec.*, Proc. Acad. 1858, 59.....Tex.
impotens Lec., Journ. Acad. 2d ser. 4, 14.....El Paso, Ar.
troglydites Lec......Tex.
Selenophorus troglydites Dej., Sp. 4, 101.
caliginosus Say, Tr. Am. Phil. Soc. 2, 26.....Tex.
Carabus caliginosus Fabr., Syst. El. 1, 188.
retractus Lec.
Harpalus impiger Lec., Proc. Acad. 7, 79.....Fr.
nitidulus Chaud., Bull. Mosc. 1843.....Tex.
gravis Lec., Proc. Acad. 1858, 60.....Tex.
dulcicollis Férté, Rev. Zool. 1841.....Tex.
- S t e n o l o p h u s Dej.
- flavipes Lec.*, Proc. Acad. 1858, 60.....SD.
ochropesus Dej., Sp. 4, 424.....Ar.
Feronia ochropeza Say, Tr. Am. Phil. Soc. 2, 54.
cincticollis Lec., Proc. Acad. 1858, 60.....Col.
californicus Lec., Pac. R. R. 47th Par. Ins. 29.....Col. S. Fr.
- D i c æ l u s Bon.
- costatus Lec.*, Tr. Am. Phil. Soc. 10, 389.....Tex.
splendidus Say, Tr. Am. Phil. Soc. 2, 69.....Tex.
Dicalus decoloratus Lec., Ann. Lyc. 4, 423.
- opacus Férté*, Rev. Zool. 1841.....Tex.
- O o d e s Bon.
- elegans Lec.*, Ann. Lyc. 5, 180.....G.
- C h l æ n i u s Bon.
- posticus Lec.*, Tr. Am. Phil. Soc. 10, 390.....Col.
Chlænus apicalis Lec., Ann. Lyc. 5, 179.
erythropus Germ., Ins. Nov. 11.....Tex.
Chlænus rufilabris Dej., Sp. 2, 329.
regularis Lec., Ann. Lyc. 5, 179.....Col.
cumatilis Lec., Ann. Lyc. 5, 179.....SD.
leucoscelis Chev., Col. Mex. cent. 1ma.....Ar.
Chlænus monachus Lec., Ann. Lyc. 5, 180.
tricolor Dej., Sp. 2, 334.....Tex.
glaucus Lec., Proc. Acad. 8, 28.....Col.
asperulus Ménétr., Bull. Petrop. 2, 55.....SD.
Chlænus obscurus Lec., Ann. Lyc. 5, 178.
? Chlænus variabilipes Esch., Zool. Atl. 5, 27.
obsoletus Lec., Ann. Lyc. 5, 180.....SD. Col.
- P a s i m a c h u s Bon.
- validus Lec.*, Journ. Acad. 2d ser. 4, 14.....Tex. Ar. Kz.
Pasimachus punctulatus Lec., Ann. Lyc. 4, 146.
corpulentus Lec., Journ. Acad. 2d ser. 4, 15.....Tex.
viridans Lec., Proc. Acad. 1858, 61.....Ar.
costifer Lec., Pr. Ac. 7, 79, J. Ac. 2d ser. 4, 15.....Tex. Kz.
- S c a r i t e s Fabr.
- californicus Lec.*, Ann. Lyc. 5, 198.....SD.
- S c h i z o g e n i u s Putzeys.
- depressus Lec.*, Ann. Lyc. 5, 197.....Col.
pluripunctatus Lec., Ann. Lyc. 5, 197.....Col.
var. simplex Lec., ibid.
crenulatus Lec., Ann. Lyc. 5, 197.....Col.
- C l i v i n a Latr.
- corvina Putzeys*, Mon. Cliv. 92.....Col. Ga.
Clivina confusa Lec., Ann. Lyc. 5, 198.
fissipes Putzeys, Mon. Cliv. 89.....Tex.
stigmula Putzeys, Mon. Cliv. 104.....Tex.
analisis Putzeys, Mon. Cliv. 81.....Tex.
- A c e p h o r u s Lec.
- marinus Lec.*, Ann. Lyc. 5, 195.....SD.
- D y s c h i r i u s Bon.
- curvispinus Putzeys*, Mon. Cliv. 41.....Tex.
sublævis Putzeys, Mon. Cliv. 42.....Tex.
edentulus Putzeys, Mon. Cliv. 51.....Tex.
tridentatus Lec., Ann. Lyc. 5, 195.....SD.
convexus Lec., Ann. Lyc. 5, 185.
patruelis Lec., Ann. Lyc. 5, 196.....SD.
basalis Lec., Proc. Acad. 1857, 77.....Col.
integer Lec., Ann. Lyc. 5, 196.....Col.
analisis Lec., Ann. Lyc. 5, 196.....Col.
gibbipennis Lec., Proc. Acad. 1857, 77.....SD.
aratus Lec., Ann. Lyc. 5, 196.....G.
- B e m b i d i u m Latr.
- O c h t h e d r o m u s Lec. (olim.)
- sempunctatum Lec.*, Ann. Lyc. 5, 186.....Col.
bifossulatum Lec., Ann. Lyc. 5, 186.....SD.
insulatum Lec., Ann. Lyc. 5, 186.....SD.
approximatum Lec., Ann. Lyc. 5, 187.....SD.
(var.) Ochthedromus consentaneus Lec., ibid.

- viridicollisTex.
No'aphus viridicollis Ferté, Rev. Zool. 1841.
 (var.) *Ochthedromus tessellatus* Lec., Ann. Lyc. 5, 188.
- patruale *Dej.*, Sp. 5, 69.....SD. NY.
- laticolle *Lec.*, Ann. Lyc. 5, 187.....Col.
- pictum *Lec.*, Ann. Lyc. 4, 461.....SD. Col.
- ephippigerum *Lec.*, Ann. Lyc. 5, 188.....SD.
- vile *Lec.*, Ann. Lyc. 5, 189.....SD.
- aratum *Lec.*, Ann. Lyc. 5, 189.....Ar.
- grandicolle *Lec.*, Ann. Lyc. 5, 189.....SD.
- striola *Lec.*, Ann. Lyc. 5, 190.....SD.
- Mannerheimii *Lec.*, Ann. Lyc. 5, 190.....SD.
Bembidium transversale† Mann., Bull. Mosc. 216.
- trechiforme *Lec.*, Ann. Lyc. 5, 190.....SI.
- L y m n æ u m* Stephens.
- laticeps *Lec.*, Proc. Acad. 1858, 61.....SD.
- P e r i c o m p s u s* Lec.
- sellatus *Lec.*, Ann. Lyc. 5, 191.....Col.
- lætulus *Lec.*, Ann. Lyc. 5, 192.....G.
- C y c h r u s* Fabr.
- heros *Lec.*, Tr. Am. Phil. Soc. 10, 398.....Red River. Ohio.
Scaphinotus heros Harris, Bost. Jr. Nat. Hist. 2, 196.
- C a r a b u s* Linn.
- finitimus *Hald.*, Stanbury's Exp. 373.....Tex.
- C a l o s o m a* Fabr.
- scrutator *Fabr.*, Syst. El. 1, 213.....Tex. Son.
- Wilcoxi *Lec.*, Ann. Lyc. 4, 446.....Tex.
- semilæve *Lec.*, Ann. Lyc. 5, 199.....SD.
- lugubre *Lec.*, Tr. Am. Phil. Soc. 10, 400.....Tex.
- prominens *Lec.*, Mels. Cat. 11.....Ar.
Calosoma angulatum|| *Lec.*, Ann. Lyc. 5, 199.
- macrum *Lec.*, Tr. Am. Phil. Soc. 10, 400.....Tex.
- O m o p h r o n* Latr.
- dentatum *Lec.*, Ann. Lyc. 5, 200.....SD.
- Gilæ *Lec.*, Ann. Lyc. 5, 200.....G.
- nitidum *Lec.*, Ann. Lyc. 4, 447.....Tex.
- DYTISCIDÆ.
- H a l i p l u s* Latr.
- concolor *Lec.*, Ann. Lyc. 5, 201.....SD.
- C n e m i d o t u s* Illiger.
- callosus *Lec.*, Ann. Lyc. 5, 201.....SD.
- simplex *Lec.*, Ann. Lyc. 5, 301.....SD.
- H y d r o p o r u s* Clairv.
- hydropicus *Lec.*, Ann. Lyc. 5, 205.....SD.
- latissimus *Lec.*, Ann. Lyc. 5, 205.....SD.
- macularis *Lec.*, Ann. Lyc. 5, 206.....Col. G.
- cinctellus *Lec.*, Ann. Lyc. 5, 206.....Col.
- amandus *Lec.*, Ann. Lyc. 5, 207.....G.
- subtilis *Lec.*, Ann. Lyc. 5, 206.....SI.
- striatellus *Lec.*, Ann. Lyc. 5, 207.....SD. El Paso.
- fortis *Lec.*, Ann. Lyc. 5, 207.....SD.
- latebrosus *Lec.*, Ann. Lyc. 4, 208.....SD.
- medialis *Lec.*, Ann. Lyc. 5, 209.....SD.
- fraternus *Lec.*, Ann. Lyc. 5, 209.....Col.
- L a c c o p h i l u s* Leach.
- truncatus *Mann.* Bull. Mosc. 1853, 160.....SD. Col. Ar. Kz.

C o p t o t o m u s Say.difficilis *Lec.*, Ann. Lyc. 5, 204.....Col.*C o l y m b e t e s* Clairv.strigatus *Lec.*, Ann. Lyc. 5, 203.....SD.binotatus *Harris*, N. Eng. Farm. 7, 164.....SD.*I l y b i u s* Er.regularis *Lec.*, Ann. Lyc. 5, 203.....SD.*A g a b u s* Leach.lugens *Lec.*, Ann. Lyc. 5, 203.....SD. Col.obsoletus *Lec.*, Jour. Acad. 2d ser. 4, 15.....SD.semivittatus *Lec.*, Ann. Lyc. 5, 204.....Col.*C y b i s t e r* Curtis.explanatus *Lec.*, Ann. Lyc. 5, 202.....SD.ellipticus *Lec.*, Ann. Lyc. 4, 202.....Col. Ar. El Paso.*D y t i s c u s* Linn.anxius *Mann.*, Bull. Mosc. 1843, 218.....SD. Val.*Dytiscus marginicollis* *Lec.*, Bost. Jr. Nat. Hist. 5, 209.*E u n e c t e s* Er.sticticus *Er.*, Gen. Dytisc. 23.....Val. (Europe).*Dytiscus sticticus* Linn.*A c i l i u s* Lech.simplex *Lec.*, Ann. Lyc. 5, 202.....SD.

basillaris.....Ar.

Dytiscus basillaris Harris, N. E. Farm. 1829, 1.*Acilius incisus* Aubé.latecinctus *Lec.*, Ann. Lyc. 5, 203.....Val.flavomaculatus *Lec.*.....CM. Ar. Mx.*Hydaticus flavomaculatus* Chevr., Col. Mx. cent. 1.*Acilius maculatus*|| *Lec.*, Proc. Acad. Nat. Sc. 7, 221.

GYRINIDÆ.

G y r i n u s Linn.plicifer *Lec.*, Ann. Lyc. 5, 209.....SD.*D i n e u t e s* M'Leay.sublineatus *Aubé*, Hydroc. 775.....Son.integer *Lec.*, Proc. Acad. 7, 221.....CM. Ar.*G y r e t e s* Brullé.sinuatus *Lec.*, Ann. Lyc. 5, 210.....Col.

HYDROPHILIDÆ.

H y d r o c h u s Germ.foveatus *Hald.*, Stansb. Rep. 375; *Lec.*, Pr. Ac. 7, 360.....Tex.variolatus *Lec.*, Ann. Lyc. 5, 193; *ibid.*.....SD.vagus *Lec.*, *ibid.* *ibid.*.....Col.*O c h t h e b i u s* Leach.puncticollis *Lec.*, Ann. Lyc. 5, 210.....Ar.lineatus *Lec.*, Ann. Lyc. 5, 211.....Col.interruptus *Lec.*, Ann. Lyc. 5, 210.....SD.fossatus *Lec.*, Pr. Acad. 7, 362.....Col.*B e r o s u s* Leach.punctatissimus *Lec.*, Ann. Lyc. 5, 211.....SD.miles *Lec.*, Pr. Acad. 7, 363.....Tex.subsignatus *Lec.*, Pr. Acad. 7, 364.....Tex.punctulatus *Lec.*, Ann. Lyc. 5, 211.....Col. Cal.exilis *Lec.*, Ann. Lyc. 5, 211.....G.*H y d r o p h i l u s* Geoffroy.triangularis *Say*, Journ. Acad. 3, 201.....Val.*Hydrophilus lugubris* Motsch. Bull. Mosc. 1845, 31.*Stethoxus subsulcatus* *Lec.* (var.) Proc. Acad. 7, 221.

lateralis *Herbst*, Käfer, 7, 296.Tex.
Hydrophilus nimbatus Say, Journ. Acad. 3, 203.
limbalis *Lec.*, Proc. Acad. 7, 367.SD. Ar.
californicus *Lec.*, Proc. Acad. 7, 367.SD. Ar.
ellipticus *Lec.*, Proc. Acad. 7, 368.Son. Santa Fe.
Hydrocharis Latr.
lineatus *Lec.*, Proc. Acad. 7, 368.SD.
Philodrus Sol.
pectoralis *Lec.*, Proc. Acad. 7, 370.Col.
cristatus *Lec.*, Proc. Acad. 7, 370.SD.
Cyclonotum Er.
cacti *Lec.*, Proc. Acad. 7, 373.SD.
Cercyon Leach.
fimbriatum *Mann.*, Bull. Mosc. 1852, 344.SD. Sitka.
capillatum *Lec.*, Proc. Acad. 7, 374.SD.
SILPHALES.
Necrophorus Fabr.
mediatus *Fabr.*, Syst. El. 1, 334.Tex.
guttula *Motsch.*, Bull. Mosc. 1845, 1, 53.SD.
Silpha Linn.
lapponica *Herbst.*, Käfer, 5, 209.SD. El Paso, Tex.
ramosa *Say.*, J. Acad. Nat. Sc. 2, 193.SD. Kz.
Silpha cervaria Mann., Bull. Mosc. 1843, 262.
truncata *Say.*, J. Ac. Nat. Sc. 3, 193.Son. Kz.
Catops Paykull.
californicus *Lec.*, Proc. Acad. 6, 281.SD. SI.
PSELAPHIDÆ.
Faronus Aubé.
Isabellæ *Lec.*, Ann. Lyc. 5, 215.SI.
Bryaxis Leach.
subtilis *Lec.*, Ann. Lyc. 5, 215.G.
foveata *Lec.*, Ann. Lyc. 5, 215.G.
STAPHYLINIDÆ.*
Aleochara Grav.
valida *Lec.*, Jour. Acad. 2d ser. 4, 16.SD.
Thinopinus Lec.
pictus *Lec.*, Ann. Lyc. 5, 216.SD.
Trichocanthus variegatus Motsch.; Mann. Bull.
Mosc., 1853, 187.
Staphylinus Linn.
villosus *Grav.*, Col. Microp. 160.SD. Tex. N. Y.
Belonuchus Nordman.
ephippiatus *Er.*, Staph. 927.SD.
Staphyl. ephippiatus Say, Tr. Am. Ph. Soc. 4, 448.
Philonthus Leach.
canescens *Mann.*, Bull. Mosc. 1852, 313.SD. Sitka.
Siegwaldi *Mann.*, Bull. Mosc. 1843, 230.SD.
Quedius Leach.
explanatus *Lec.*, Proc. Acad. 1858, 61.SD.

* Besides the species mentioned, species were found by me of the following genera: *Aleochara*, *Tachyusa*, *Myllæna*, *Homalota*, *Tachinus*, *Othius*, *Leptacinus*, *Philonthus*, *Quedius*, *Cryptobium*, *Lathrobium*, *Sunius*, *Lithocharis*, *Lispinus*, *Isomalus*, *Pinophilus*, *Palaminus*, *Stenus*, *Oxytelus*, *Bledius*, *Trogophilus*, *Apocellus*.

Pæderus Fabr.
femoralis *Lec.*, Proc. Acad. 1858, 62.G.
ustus *Lec.*, Proc. Acad. 1858, 62.Col.
HISTERIDÆ.
Hololepta Payk.
populnea *Lec.* Ann. Lyc. 5, 162.Col.
Hololepta bractea Er. (fide de Marseul)...South Amer.
cacti *Lec.*, Ann. Lyc. 5, 162.SD.
vicina *Lec.*, Ann. Lyc. 5, 162.SD.
Hister Linn.
texanus *Marseul*, (Omalodes), Ann. Ent. Soc. Fr. 3d
ser. 1, 506.Tex.
incertus *Marseul*, Ann. Ent. Soc. Fr. 3d. ser. 2, 269...Tex.
cænosus *Er.* Klug's Jahrb. 140.Tex.
Hister decius Lec. Bost. Jour. Nat. Hist.
costatus *Lec.*, Marseul. Ann. Ent. Soc. Fr. 3d ser. 5, 407.
corticalis *Lec.*, Ann. Lyc. 5, 163.Col.
Epierus Er.
vicinus *Lec.*, Ann. Lyc. 5, 164.Col.
decipiens *Lec.* Ann. Lyc. 5, 164.Col.
Epierus planulus Er., (fide Marseul.)...New Grenada.
Paromalus Er.
opuntiae *Lec.*, Ann. Lyc. 5, 164.SD.
consors *Lec.*, Ann. Lyc. 5, 164.SD.
Gilensis *Lec.*, Ann. Lyc. 5, 164.Gila.
Paromalus tenellus Er., (fide Marseul.)...New Grenada.
Saprinus Leach.
alienus *Lec.*, Ann. Lyc. 5, 167.Col.
discoidalis *Lec.*, Ann. Lyc. 5, 167.Col.
interceptus *Lec.*, Ann. Lyc. 5, 166.SD.
pectoralis *Lec.*, Ann. Lyc. 5, 166.SD.
lugens *Er.*, Klug's Jahrb. 181.SD. Col. Ar. Kz.
Saprinus californicus Mann. Bull. Mosc. 1845, 259.
ciliatus *Lec.*, Ann. Lyc. 5, 168.Col.
vinctus *Lec.*, Ann. Lyc. 5, 168.SD.
pennsylvanicus *Er.* Klug, Jahr. 184.Tex.
Hister pensylvanicus Paykull, Hist. 61
assimilis *Er.*, Klug, Jahr. 184.Tex.
Hister assimilis Paykull, Hist. 62.
laridus *Lec.*, Ann. Lyc. 5, 168.SD.
scissus *Lec.*, Ann. Lyc. 5, 168.SD.
fimbriatus *Lec.*, Ann. Lyc. 5, 169.Col.
plenus *Lec.*, Ann. Lyc. 5, 169.Col.
vitiosus *Lec.*, Ann. Lyc. 5, 169.SD.
lubricus *Lec.*, Ann. Lyc. 5, 169.SD.
cærulescens *Lec.*, Ann. Lyc. 5, 169.SD.
bigemmeus *Lec.*, Ann. Lyc. 5, 169.SD.
sulcifrons *Mann.* Bull. 1843, 259.SD.
serrulatus *Lec.*, (Pachylopus) Ann. Lyc. 165.SD.
gaudens *Lec.*, (Pachylopus) Ann. Lyc. 5, 165.SD.
two species.Tex.
Acritus *Lec.*
basalis *Lec.* Proc. Acad. 6, 290.Col.
Abreus basalis Lec. Ann. Lyc. 5, 165.SD.
maritimus *Lec.*, Proc. Acad. 6, 290.SD.
Abreus maritimus Lec., Ann. Lyc. 5, 170.

PHALACRIDÆ.

Phalacrus Payk.

ovalis *Lec.*, Proc. Acad. 8, 15.SD.
penicellatus *Say*, Jour. Acad. 4, 91.SD.

- NITIDULIDÆ.
Colastus Er.
limbatus Lec., Proc. Acad. 1858, 62.....Col.
obliquus Lec., Proc. Acad. 1858, 62.....Col.
Nitidula Fabr. (emend. Er.)
ziczac Say, Jour. Acad. 5, 179.....Tex.
Carpophilus Leach.
pallipennis Lec......El Paso.
Cercus pallipennis Say, Jour. Acad. 3, 194.
Carpophilus floralis Er., Germ. Zeitsch. 4, 261.
discoideus Lec., Proc. Acad. 1858, 62.....Col.
TROGOSITIDÆ.
Temnochila Westwood.
ærea Lec., Proc. Acad. 1858, 63SD. S. Fr.
chlorodia Lac., Gen. Col. 2, 341.....SD. Ar. S. Fr.
Trogosita chlorodia Mann. Bull. Mosc. 1843, 301.
acuta Lec., Proc. Acad. 1858, 63.....Tex.
COLYDIDÆ.
Anchomma Lec.
costatum Lec., Proc. Acad. 1858, 63.....SD.
Rhagoderma Er.
tuberculata Mann., Bull. Mosc. 1843, 300.....SD.
Ditoma Latr.
sulcata Lec., Proc. Acad. 1858, 63.....Col.
ornata Lec., Proc. Acad. 1858, 63.....Col.
Synchita Hellw.
variegata Lec., Proc. Acad. 1858, 63.....Col.
MYCETOPHAGIDÆ.
Litargus Er.
balteatus Lec., Proc. Acad. 8, 14Col.
CRYPTOPHAGIDÆ.
Cryptophagus Herbst.
cellaris Er., Ins. Deutsch. 2, 361.....SD. Europe.
Dermestes cellaris Scopoli.
Cryptophagus crenatus Herbst.
debilis Lec., Proc. Acad. 8, 64.....SI.
pilosus Lec., Proc. Acad. 8, 64.....Col.
saginatulus? Sturm......Tex. Europe.
Atomaria Kirby.
one species.....SD.
EROTYLIDÆ.
Ischyryus Lac.
quadripunctatus Lac., Mon. Erot. 127.....Tex. Georgia.
Erotylus 4-punctatus Oliv.
Triplax Paykull.
affinis Lec., Journ. Acad. 2d ser. 1, 71.....Tex.
Tritoma affinis Lac., Mon. Erst. 224
atriventris Lec., Jour. Acad. 2d ser. 1, 71.
Erotylus Fabr.
Boisduvalii Chevr., Col. Mex. 2d cent.....Son.
LATHRIDIDÆ.
Corticaria Marsham.
scissa Lec., Proc. Acad. 7, 301.....Col.
expansa Lec., Proc. Acad. 7, 301.....SD.
compta Lec., Proc. Acad. 7, 301.....SD.
levis Lec., Proc. Acad. 7, 302.....Col.
morsa Lec., Proc. Acad. 7, 302.....Col.
Lathridius Illiger.
crenatus Lec., Proc. Acad. 6, 304.....SD.
Monotoma Herbst.
mucidum Lec., Proc. Acad. 7, 305.....Col.
marinum Lec., Proc. Acad. 1858, 64.....SD.
striatum Lec., Proc. Acad. 1858, 65.....Col.
CUCUJIDÆ.
Læmophloeus Er.
fasciatus Mels. Proc. Acad. 2, 113.....Tex.
bullatus Lec., Proc. Acad. 7, 75.....Col.
nitens Lec., Proc. Acad. 7, 75.....Cal.
puberulus Lec. Proc. Acad. 7, 75.....Col.
cephalotes Lec., Proc. Acad. 7, 75.....Col.
Silvanus Latr.
nitidulus Lec., Proc. Acad. 7, 78.....Col.
opaculus Lec., Proc. Acad. 7, 75.....SD.
DERMESTIDÆ.
Dermestes Linn.
Mannerheimii Lec., Proc. Acad. 7, 107.....SD.
Dermestes marmoratus† Mann., Bull. Mosc. 1843, 258.
nubilus Say, Insects of Louisiana; Lec. Proc. Acad.
7, 107.....Tex.
sobrinus Lec., Proc. Acad. 7, 108.....Tex.
vulpinus Fabr., Syst. El. 1, 314.....Tex. Ar. SD.
Trogoderma Latr.
ornatum Lec., Proc. Acad. 7, 110.....Tex.
Megatoma ornatum Say, Journ. Acad. 5, 185
pusillum Lec., Proc. Acad. 7, 110.....El Paso, La.
Cryptorhopalum Guérin.
balteatum Lec., Proc. Acad. 7, 111.....SD.
triste Lec., Proc. Acad. 7, 111.....SD.
fusculum Lec., Proc. Acad. 7, 111.....Col.
Anthrenus Geoffr.
lepidus Lec., Proc. Acad. 7, 112.....SD.
varius Fabr., Syst. El. 1, 109.....SD.
BYRRHIDÆ.
Physemus Lec.
minutus Lec., Proc. Acad. 7, 117.....Col.
PARNIDÆ.
Lutrochus Er.
luteus Lec., Proc. Acad. 6, 42.....Tex.
Pelonomus Er.
obscurus Lec., Proc. Acad. 6, 42.....Tex.
Helichus Er.
suturalis Lec., Proc. Acad. 6, 43.....SD.
productus Lec., Proc. Acad. 6, 44.....SD.
Gilensis Lec., Proc. Acad. 6, 43.....G.
æqualis Lec., Proc. Acad. 7, 81.....Fr.

HETERO CERIDÆ.

Heterocerus Fabr.

- four species..... SD.
two species..... Col.
one species..... Tex.

SCARABÆIDÆ.

Xyloryctes Hope.

- Satyrus* Hope, Col. Man. 1, 90..... Tex.
Geotrupes *Satyrus* Fabr., Syst. El. 1, 15.

Phileurus Latr.

- cribrosus* Lec., Proc. Acad. 7, 80..... Tex.
valgus Dej., Cat. 166..... Tex.
Geotrupes *valgus* Fabr., Syst. El. 1, 18.
Phileurus *castaneus* Hald., Proc. Acad. 1, 304.
illatus Lec., Proc. Acad. 7, 80..... Vall.

Strategus Hope.

- Antæus* Burm., Lamell. 3, 130..... Tex.
Geotrupes *Antæus* Fabr.
Morion Burm., Lamell. 3, 130..... Tex.
Julianus Burm., Lamell. 3, 133..... Tex. Mex.

Aphonus Lec.

- clunalis* Lec., Proc. Acad. 8, 23..... Ar.

Ligyris Burm.

- gibbosus* Lec., Proc. Acad. 8, 20..... Tex. Vall. SD.
Scarabæus *gibbosus* De Geer, 4, 322.
Podalgus *variolosus* Burm., Lamell. 3, 121.
Bothynus *obsoletus* Lec., (var.) Jr. Ac. 2d ser. 1, 87.
ruginasus Lec., Proc. Acad. 8, 20..... Tex.

Chalepus McLeary.

- obsoletus* Lec., Proc. Acad. Nat. Sc. 7, 222..... Ar.

Cyclocephala Latr.

- immaculata* Burm., Lamell. 3, 53..... Ar.
Melolontha *immaculata* Oliv., 5, 29; tab. 8, 95

Trichius Fabr.

- piger* Fabr., Syst. El. 2, 122..... Tex.

Cremastochilus Knoch.

- saucius* Lec., Journ. Acad. 2nd ser. 4, 16..... Llano Est.
Schaumii Lec., Proc. Acad. 6, 231..... SD.

Euryomia Burm., (emend. Lac.)

- melancholica* Lac..... Tex.
Cetonia *melancholica* Gory, Mon. Cet. 210.

- Kernii* Lac..... Tex.
Euphoria *cernii* Hald., St. Exp. 374, tab. 9, f. 10.

- Clarkii* Lac..... Tex.
Erirhipis *Clarkii* Lec. Pr. Acad. 6, 441.

- Schottii* Lac..... Tex.
Erirhipis *Schottii* Lec., Proc. Acad. 6, 441.

Gymnetis MLeay.

- Sallei* Schaum, Ann. Ent. Soc. Fr. 2nd ser. 7, 255..... Tex. Mex.
Gymnetis *tristis*† Burm., Lamell. 3, 551.

Allorhina Burm., (emend. Lacordaire).

- nitida* Lac..... Tex. Ar.
Scarabæus *nitidus* Linn.

- Cotinis* *nitida* Burm., Lamell. 1, 256.
mutabilis? Burm., (Cotinis,) Lamell. 1, 255..... Ar. Mex.

Plusiotis Burm.

- gloriosa* Lec., Proc. Acad. Nat. Sci. 7, 221..... CM.

Anomala Samouelle.

- parvula* Burm., Lamell. 2, 247..... Son. Ga.

- varians* Burm., Lamell. 2, 248..... Tex.
Melolontha *varians* Fabr., Syst. El. 2, 173.

- marginata* Burm., Lamell. 2, 266..... Tex.

- luteipennis* Lec., Pr. Acad. 7, 80..... Tex.

Strigoderma Burm.

- arboricola* Burm., Lamell. 1, 315..... Tex.
Melolontha *arboricola* Fabr.

Polyphylla Harris.

- decemlineata* Lec., Proc. Acad. 7, 218..... Tex.
Melolontha *10-lineata* Say, Journ. Acad. 3, 246.

- carifrons* Lec., Proc. Acad. 7, 222..... Ar.

- subvittata* Lec., Journ. Acad. 2nd ser. 3, 229..... Tex.

Listrochelus Blanch.

- mucoreus* Lec., Journ. Acad. 2nd ser. 3, 263..... Col. Tex.

- texanus* Lec., Journ. Acad. 2nd ser. 3, 263..... Tex.

- scoparius* Lec., ibid. 3, 264..... Ar.

Eugastera Lec.

- cribrosa* Lec., Pr. Acad. 7, 217..... Tex.
Tostegoptera *cribrosa* Lec., Pr. Acad. 6, 231.

- ventricosa* Lec., Pr. Acad. 7, 217..... Tex.
Tostegoptera *ventricosa* Lec., Proc. Acad. 6, 448.

Lachnosterna Hope.

- lanceolata* Lec., Journ. Acad. 2nd ser. 3, 237..... Tex. Kz.
Melolontha *lanceolata* Say, Journ. Acad. 3, 242.

- Tostegoptera* *lanceolata* Blanchard, Cat. Mus. Par. 149.
Ancylonycha *lanceolata* Lac., Gen. Col. 3, 285.

- fareta* Lec., Journ. Acad. 2nd ser. 3, 238..... Tex.

- æqualis* Lec., ibid. 3, 238..... Tex.
Tostegoptera *æqualis* Lec., Pr. Acad. 6, 440.

- Burmeisteri* Lec., Journ. Acad. 2nd ser. 3, 242..... Tex.
Trichestes *longitarsis*† Burm., Lamell. 2, 2nd, 359.

- torta* Lec., Journ. Acad. 2nd ser. 3, 239..... Tex.

- calceata* Lec., Journ. Acad. 2nd ser. 3, 250..... Tex.

- submucida* Lec., Journ. Acad. 2nd ser. 3, 260..... Tex.

- obesa* Lec., Journ. Acad. 2nd ser. 3, 251..... Tex.

- congrua* Lec., Journ. Acad. 2nd ser. 3, 243..... Tex.

- corrosa* Lec., Journ. Acad. 2nd ser. 3, 249..... Tex.

- rubiginosa* Lec., Journ. Acad. 2nd ser. 3, 259..... Tex.

- glabripennis* Lec., ibid. 3, 260..... Tex.

- crinita* Lec., ibid. 3, 261..... Tex.

- Trichesthes* *crinita* Burm., Lamell. 2, 2nd, 358.

Diplotaxis Kirby.

- angularis* Lec. Journ. Acad. 2nd ser. 3, 268..... CM.

- tenuis* Lec., Journ. Acad. 2nd ser. 3, 271..... Vall.

- punctipennis* Lec., Journ. Acad. 2nd ser. 3, 268..... Tex.

- moerens* Lec., Journ. Acad. 2nd ser. 3, 268..... Vall.

- texana* Lec., Journ. Acad. 2nd ser. 3, 268..... Tex.

- frondicola* Lec., Journ. Acad. 2nd ser. 3, 269..... Tex.

- Melolontha* *frondicola* Say, Journ. Acad. 5, 198.

- Diplotaxis* *testacea* Burm., Lamell. 2, 2nd, 263.

- dubia* Lec., Lamell. 2, 2nd, 269..... Tex.

- consors* Lec., Lamell. 2, 2nd, 269..... Tex.

- carbonata* Lec., Lamell. 2, 2nd, 270..... Tex. Ar.

- atrata* Lec., Lamell. 2, 2nd, 270..... Fr.

- punctata* Lec., Lamell. 2, 2nd, 270..... Fr.

- cribulosa* Lec., Lamell. 2, 2nd, 270..... Fr.

- corvina* Lec., Lamell. 2, 2nd, 272..... Col.

- pacata* Lec., Lamell. 2, 2nd, 272..... Ar.

- brevidens Lec.*, Lamell. 2, 2nd, 272.....Ar.
Orsonyx Lec.
anxius Lec., Journ. Acad. 2nd ser. 3, 266.....Ar.
Macroductylus Latr.
angustatus Lec., Journ. Acad. 2nd ser. 3, 278.....Ar. NY.
Melolontha elongata|| Herbst., Col. 3, 145, tab. 26, f. 3.
Melolontha angustata Beauv. Ins. 30, tab. 5, f. 6.
Serica MLeay.
texana Lec., Journ. Acad. 2nd ser. 3, 274.....Tex.
fimbriata Lec., Journ. Acad. 2nd ser. 3, 275.....SD.
alternata Lec., ibid. 3, 276.....SD.
mixta Lec., ibid. 3, 276.....SD.
Lasiopus Lec.
ferrugineus Lec., Journ. Acad. 2nd ser. 3, 283.....Tex.
Oncerus Lec.
floralis Lec., Journ. Acad. 2nd ser. 3, 284.....Vall.
Geotrupes Latr.
opacus Haldeman, Pr. Acad. 6, 362.....Tex.
Bolbocerus Kirby.
Lazarus Laporte, Hist. Nat. Ins. 2, 105.....Tex. Ar.
Scarabæus Lazarus Fabr.
Scarabæus Melibæus Fabr.
Athyreus MLeay.
fossatus Lec., Pr. Acad. 7, 80.....Tex.
Bolbocerus fossatus Hald., Pr. Acad. 6, 362.
serratus Lec., Pr. Acad. 7, 80.....Tex.
Canthon Illiger.
vigilans Lec., Journ. Acad. 2nd ser. 4, 16.....Tex. Ga.
lævis.....Tex. NY.
Scarabæus lævis Drury. Ins. 1, tab. 35, f. 7.
Scarabæus volvens Fabr., Syst. El. 1, 60.
Scarabæus pilularius De Geer. 4, 311.
ebenus Mels. Cat. 53.....Tex. Pa.
Ateuchus ebenus Say, Journ. Acad. 3, 208.
simplex Lec., P. R. R. Ins. 47°, 41.....SD.
Onthophagus Latr.
Hecate.....Tex.
Scarabæus Hecate Panzer, F. Am. Bor. 4, tab. 1, f. 2.
Copris latebrosus Fabr., Syst. El. 1, 34.
Phanæus MLeay.
difformis Lec., Journ. Acad. 2nd ser. 1, 86.....Tex.
triangularis Lec., ibid.....Tex.
Copris triangularis Say, Journ. Acad. 3, 206.
Phanæus torrens Lec., (var.) Jr. Acad. 2nd ser. 1, 85.
Copris Geoffr.
carolina Fabr., Syst. El. 1, 43.....Tex. NY.
Scarabæus carolinus Linn.
moecha Lec., Pr. Acad. Mat. Sci. 7, 222.....Ar.
anaglyptica Say, Journ. Acad. 3, 204.....Tex. NY.
Ochodæus Latr.
simplex Lec., Pr. Acad. Nat. Sc. 7, 222.....CM.
striatus Lec., ibid.....Ar.
Aphodius Illiger.
rubidus Lec., P. R. R. Ins. 47°, 41.....SI.
dentiger Lec., Pr. Acad. 1858, 65.....CM.
militaris Lec., Pr. Acad. 1858, 65.....SD.
Euparia Lep.
cognata Lec., Pr. Acad. 1858, 65.....Tex. Ar.
- strigata*.....Col.
Aphodius strigatus Say, Journ. Acad. 3, 212.
Aphodius spretulus Hald., Journ. Acad. 2nd ser. 1, 103.
puncticollis Lec., Pr. Acad. 1858, 66.....El Paso.
gracilis Lec......Ar.
Ozyomus gracilis Mels. Pr. Acad. 2, 137.
Trox Fabr.
Sonoræ Lec., Pr. Acad. 7, 211.....Ar.
O morgus Er.
texanus Lec., Pr. Acad. 7, 211.....Tex.
suturalis Lec., Pr. Acad. 214.....Tex.
umbonatus Lec., Pr. Acad. 7, 214.....Tex.
scabrosus Lec., Pr. Acad. 7, 215.....Tex.
Trox scabrosus Beauv., Ins. 175, tab. 4b, f. 4.
punctatus Lec., Pr. Acad. Nat. Sc. 7, 215.....Tex.
Trox punctatus Germ. Ins., Nov. 113.
Trox alternatus Say., Bost. Journ. Nat. Hist. 1, 179.
morsus Lec., Pr. Acad. 7, 216.....Tex. Kz.
integer Lec., Pr. Acad. 7, 216.....Tex. Ar.
tesselatus Lec., Pr. Acad. 7, 216.....Ar.
 BUPRESTIDÆ.
Psiloptera Sol. (emend Lac.)
Webbii Lec., Pr. Acad. 1858, 66.....Ar.
Woodhousei Lec.
var. valens Lec., Pr. Acad. 1858, 66.....Tex.
Dicerca? Woodhousei Lec., Pr. Acad. 6, 68.
*Gyascutus Lec.**
Chalcophora† Lec.
planicosta Lec., Pr. Acad. 1858, 66.....Ar.
obliteratus Lec., Pr. Acad. 1858, 66.....Ar.
cœlatus Lec., Pr. Acad. 1858, 67.....Ar.
sphenicus Lec., (Buprestis) Pr. Acad. 7, 83.....Tex.
Thrincopyge Lec.
alacris Lec., Journ. Acad. 2nd ser. 4, 47.....Ar. N. Mex.
ambiens Lec......Fr.
Buprestis ambiens Lec., Pr. Acad. 7, 83.
Melanophila Esch.
longipes Lec......Ar.
Buprestis longipes Say, Journ. Acad. 3, 164.
Chrysobothris Esch.
nigrofasciata Lap. & Gory, 221, tab. 5, fig. 32....Llano Est.
gemmata Lec., Pr. Acad. 1858, 67.....Ar.
otocola Lec., Pr. Acad. 1858, 67.....Tex. Col.
basalis Lec., Pr. Acad. 1858, 68.....Tex.
? Chrysobothris atabalipa Lap., 2, 43, tab. 8, f. 60.
exesa Lec., Pr. Acad. 1858, 68.....Col. Ar.
Alabama Gory & Lap., 4, 185; tab. 32, f. 183.....Tex.
Polycesta Esch.
Velasco Lap. & Gory, 2, 6; tab. 1, f. 7.....Tex.
elata Lec., Pr. Acad. 1858, 68.....Tex.
Acmaodera Esch.
variegata Lec., Pr. Acad. 6, 67.....Tex. Kz.
semivittata Lec., Pr. Acad. 1858, 69.....Tex.
flavomarginata Lap. & Gory, 1, 2, tab. 1, f. 2.....Tex.
hæmorrhœa Lec., Pr. Acad. 1858, 69.....Tex.
gibbula Lec., Pr. Acad. 1858, 69.....Ar.
opacula Lec., Pr. Acad. 1858, 69.....El Paso.

*This genus will be described in a synopsis of the Buprestidæ of the U. S., now being prepared for publication.

comata Lec., Pr. Acad. 1858, 70...Col.
ornata Lap. & Gary, 1, 6; tab. 2, f. 7.....Tex.
Buprestis ornata Fabr.

Agrilus Esch.

muticus Lec., Pr. Acad. 1858, 70.....Tex.
macer Lec., Pr. Acad. 1858, 70.....Tex.
politus Say, Tr. Am. Phil. Soc., 6, 162.....Col. Ar. Kz. NY.
Buprestis politus Say, Ann. Lyc. 1, 249.

ELATERIDÆ.

Limoni Esch.

auripilis Lec., Tr. Am. Phil. Soc. 10, 429.....Tex.
Elater auripilis Say, Journ. Acad. 3, 172.
mirus Lec., Tr. Am. Phil. Soc. 10, 529.....SD.
pilosus Lec., Tr. Am. Phil. Soc. 10, 432.....SD.
canus Lec., Tr. Am. Phil. Soc. 10, 433.....SD.

Crigmus Lec.

hepaticus Lec., Tr. Am. Phil. Soc. 10, 543.....Tex.
Elater hepaticus Germ., Ins. Nov. 43.
Aphanobius hepaticus Germ., Zeitschr. 5, 184.
texanus Lec., Tr. Am. Phil. Soc. 10, 454.....Tex.

Dicrepidius Esch.

ferreus Lec., Tr. Am. Phil. Soc. 10, 462.....Tex.
simplex Lec., Tr. Am. Phil. Soc. 10, 462.....Tex.

Elater Linn.

turbulentus Lec., Tr. Am. Phil. Soc. 10, 463.....SD.

Cratonychus Er.

longulus Lec., Tr. Am. Phil. Soc. 10, 473.....SD.

Monocrepidius Esch.

lividus Lec., Tr. Am. Phil. Soc. 10, 482.....Tex. Ar.
Elater lividus De Geer., Ins. 4, 162
Elater lobatus Say, Jour. Acad. 3, 175.
sordidus Lec., Tr. Am. Phil. Soc. 10, 482.....G.
vespertinus Dej., Cat. 98.....Tex. NY.
Elater vespertinus Fabr. Syst. El. 2, 240.
livens Lec., Tr. Am. Phil. Soc. 10, 484.....Vall.

Hemirhipis Latr.

fascicularis Latr.....Tex. Pa. Brazil.
Elater fascicularis Fabr., Syst. El. 2, 222.

Cryptohypnus Esch.

ornatus Lec., Tr. Am. Phil. Soc. 10, 487.....SD.
futilis Lec., Tr. Am. Phil. Soc. 19, 488.....SD.
inops Lec., Tr. Am. Phil. Soc. 10, 488.....SD.

Agrypnus Esch.

Sallei Lec., Tr. Am. Phil. Soc. 10, 491.....Tex. Ar.
Schottii Lec., Tr. Am. Phil. Soc. 10, 492.....Tex.

Pyrophorus Illiger.

physoderus Germ., Zeitschr. 3, 36.....Tex.

Alaus Esch.

gorgops Lec.....Tex.
Alaus oculatus Lec., (var.) Tr. Am. Phil. Soc. 10, 496.

Chalcolepidius Esch.

Webbii Lec., Proc. Acad. Nat. Sci. 7, 223.....Ar.
smaragdinus Lec., ibid.....Ar.

Cardiophorus Esch.

obscurus Lec., Tr. Am. Phil. Soc. 10, 498.....SD.
sufflatus Lec., Tr. Am. Phil. Soc. 10, 499.....SD.
inanus Lec., Tr. Am. Phil. Soc. 10, 499.....SD.

Aphricus Lec.

californicus Lec., Tr. Am. Phil. Soc. 10, 501.....SD.

Plastocerus Lec.

Schaumii Lec., Tr. Am. Phil. Soc. 10, 502.....SD.

Euthysanius Lec.

lautus Lec., Tr. Am. Phil. Soc. 10, 503.....SD.

CEBRIONIDÆ.

Scaptolenus Lce.

femoralis Lec., Tr. Am. Phil. Soc. 10, 504.....Tex. Mex.
Cebrio femoralis Chev. Col. Mex. 2nd cent.

ATOPIDÆ.

Schizopus Lec.

lætus Lec., Pr. Acad. 1858, 71.....Ar.

LAMPYRIDÆ.

Photinus Lap. (emend. Lec.)

pyralis Lap., Ann. Ent. Soc. Fr. 2, 141.....Tex.
Lampyrus pyralis Linn.
Lampyrus centrata Say, Jour. Acad. 5, 162.
Lampyrus rosata Germ., Ins. Nov. 62.

TELEPHORIDÆ.

Chauliognathus Hentz.

profundus Lec., Pr. Acad. 1858, 71.....Ar.
limbicollis Lec., Pr. Acad. 1858, 71.....Ar.
scutellaris Lec., Proc. Acad. 6, 230.....Tex. Ar.
discus Lec., Proc. Acad. 6, 230.....Tex.

Telephorus Geoffr.

tibialis Lec., Pr. Acad. 5, 340.....SD.
consors Lec., Pr. Acad. 5, 340.....SD.
planicollis Lec., Jour. Acad. 2nd ser. 4, 11.....Llano Est.

Podabrus Fischer.

cavicornis Lec., Pr. Acad. 5, 345.....SD.

MELYRIDÆ.

Collops Er.

bipunctatus Er., Entomographien, 55.....Tex.
Malachius bipunctatus Say, Jour. Acad. 3, 185,
marginicollis Lec., Pr. Acad. 6, 164.....SD.
cribrosus Lec., Pr. Acad. 6, 164.....SD.
balteatus Lec., Pr. Acad. 6, 230.....Tex.
marginellus Lec., Pr. Acad. 6, 164.....Col.

Malachius Fabr.

longiceps Lec., Pr. Acad. 6, 165.....SD.

Anthocomus Er.

circumscripatus Er., Entomographien, 107.....Tex.
Malachius circumscripatus Say, Jour. Acad. 3, 185.
cinctus Lec., Pr. Acad. 6, 166.....Col.
difficilis Lec., Pr. Acad. 6, 166.....Col.
lobatus Lec., Pr. Acad. 6, 166.....Col.
scincetus Er., Entomographien, 109.....Tex.
Malachius scincetus Say, Jour. Acad. 5, 170.
basalis Lec., Pr. Acad. 6, 166.....Col.

Ebaeus Er.

submarginatus Lec., Pr. Acad. 6, 167.....Col.

Microlipus Lec.

laticeps Lec., Pr. Acad. 6, 168.....SD.

Atelestus Er.

basalis Lec., Proc. Acad. 6, 168.....SD.
abdominalis Lec., Pr. Acad. 6, 168.....SD.

Dasytes Fabr.

fuscus Lec., Pr. Acad. 6, 169.....Vall.
suturalis Lec., Proc. Acad. 6, 169.....SD.
conformis Lec., Pr. Acad. 6, 169.....SD.
sordidus Lec., Pr. Acad. 6, 169.....SD.
griseus Lec., Pr. Acad. 6, 169.....SD.
brevicornis Lec., Pr. Acad. 6, 169.....SD.
squalidus Lec., Pr. Acad. 6, 169.....SD.
ænescens Lec., Pr. Acad. 6, 170.....SD.
constrictus Lec., Pr. Acad. 6, 170.....SD.
obscurus Lec., Pr. Acad. 6, 170.....SD.
luteipes Lec., Pr. Acad. 6, 170.....SD.
pusillus Lec., Pr. Acad. 6, 170.....SD.
erythropus Lec., Pr. Acad. 6, 171.....El Paso.
rufipennis Lec., Pr. Acad. 1858, 71.....Ar.

Rhadalus Lec.

testaceus Lec., Ann. Lyc. 5, 212.....Col. Ar. Tex.

CLERIDÆ.

Cymatodera Gray.

morosa Lec., Pr. Acad. 1858, 71.....Ar.
punctata Lec., Ann. Lyc. 5, 212.....Col. Ar.
fuscata Lec., Ann. Lyc. 5, 212.....Col.
usta Lec., Pr. Acad. 1858, 71.....Tex.
cancellata Lec., Pr. Acad. 7, 81.....Tex.
balteata Lec., Pr. Acad. 7, 81.....Tex.

Tarsostenus Spin.

albifasciatus Lec., Ann. Lyc. 5, 17.....Tex.
Opilus albifasciatus Mels., Pr. Acad. 2, 306.

Trichodes Herbst.

tenellus Lec., Pr. Acad. 1858, 72.....Col.
bibalteatus Lec., Journ. Acad. 2d ser. 4, 18.....Tex.

Clerus Geoffr.

Spinolæ Lec., Pr. Acad. 6, 230.....Tex. Ar.
affiliatus Lec., Pr. Acad. 1858, 72.....Tex.
latecinctus Lec., Pr. Acad. 1858, 72.....Col. Ar.
abruptus Lec., Pr. Acad. 1858, 72.....Tex.

Hydnocera Newman.

scabra Lec., Ann. Lyc. 5, 213.....SD.
discoidea Lec., Ann. Lyc. 5, 213.....Col.
bicolor Lec., Ann. Lyc. 5, 213.....Col.

Enoplium Latr.

pilosum Say., Am. Ent. 3, pl. 41.....Tex.
Lampyris pilosa Forster, Cent. Ins. 49.
fasciatum Lec., Ann. Lyc. 5, 214.....SD.
quadrinotatum Hald., Pr. Acad. 6, 362.....Tex.
vestitum Klug., Abh. Berl. Ak. 1840, 363; t. 1, f. 10, Tex. Mex.
Brachymorphus vestitus Chev., Col. Mex. 2d cent.

PTINIORES.

Dorcatoma Herbst.

grave Lec., Pr. Acad. 1858, 72.....Tex.
pusillum Lec., Pr. Acad. 1858, 72.....Col.

Anobium Fabr.

setiferum Lec., Pr. Acad. 1858, 73.....SD.

Ptilinus Geoffr.

basalis Lec., Pr. Acad. 1858, 73.....SD.

Apate Fabr.

punctipennis Lec., Pr. Acad. 1858, 73.....SD. Tex. Ar. Mex.

Sinoxylon Redt.

sextuberculatum Lec., Pr. Acad. 1858, 73.....Col.
asperum Lec., Pr. Acad. 1858, 73.....Col.
sericans Lec., Pr. Acad. 1858, 73.....Tex.

Exops Curtis.

exesus Lec., Pr. Acad. 1858, 74.....Tex.

Lycetus Fabr.

striatus Mels., Pr. Acad. 2, 112.....SD. NY.
planicollis Lec., Pr. Acad. 1858, 74.....Col.

Cis Latr.

vitulus Mann., Bull. Mosc. 1843, 299.....SD.

TENEBRIONIDÆ.

Epitragus Latr.

submetallicus Lec., Proc. Acad. 7, 224.....Ar.
canaliculatus Say, Long's Exp. 2, 281.....Tex. Ar. N.Y.

Edrotes Lec.

ventricosus Lec., Ann. Lyc. 5, 141.....Col.

Triorophus Lec.

nodiceps Lec., Proc. Acad. 6, 446.....Tex.
lævis Lec., Ann. Lyc. 5, 141.....Col.
punctatus Lec., Ann. Lyc. 5, 142.....Vall.

Craniotus Lec.

pubescens Lec., Ann. Lyc. 5, 142.....Vall.

Auchmobius Lec.

sublævis Lec., Ann. Lyc. 5, 140.....Vall.

Cryptadius Lec.

inflatus Lec., Ann. Lyc. 5, 140.....SD.

Eurymetopon Esch.

abnorme Lec., Ann. Lyc. 5, 138.....Col. Tex.
convexicollis Lec., Ann. Lyc. 5, 139.....Col.
longulum Lec., Ann. Lyc. 5, 139.....SD.
obesum Lec., Ann. Lyc. 5, 139.....SD.
atrum Lec., Ann. Lyc. 5, 139.....SD.

Nyctoporis Esch.

carinata Lec., Ann. Lyc. 5, 138.....SD.

Aræoschizus Lec.

costipennis Lec., Ann. Lyc. 5, 138.....Vall.

Batulius Lec.

setosus Lec., Ann. Lyc. 5, 148.....Col.
rotundicollis Lec., Ann. Lyc. 5, 148.....Col.

Anepsius Lec.

delicatus Lec., Ann. Lyc. 5, 148.....Col.

Centrioptera Mann.

muricata Lec., Ann. Lyc. 5, 142.....Col.

Cryptoglossa Solier.

infausta Lec.,.....Tex.
Asbolus infaustus Lec., Pr. Acad. 7, 84.

verrucosa Lec.,.....Col.
Asbolus verrucosus Lec., Ann. Lyc. 5, 129.

lævis Lec.,.....Col.
Asbolus lævis Lec., Ann. Lyc. 530.

- Astrotus Lec.*
contortus Lec......Tex.
Microschatia contorta Lec. Pr. Acad. 5, 446.
- Microschatia Sol.*
inæqualis Lec., Ann. Lyc. 5, 129.....SD.
puncticollis Lec., Ann. Lyc. 5, 129.....Warner's.
sulcipennis Lec., Journ. Acad. 2nd ser. 4, 18.....Llano Est.
- Philolithus Lec.*
Pelecyporus Sol. Lec.
elatus Lec., Pr. Acad. 6, 445.....Tex. Ar.
difformis Lec., Pr. Acad. 7, 723.....Ar.
confluens Lec., Ann. Lyc. 5, 128.....Col.
marginatus Lec., Ann. Lyc. 5, 128.....G.
hispidulus Lec., Ann. Lyc. 5, 127.....Col.
hirsutus Lec., Ann. Lyc. 5, 127.....Col.
obsoletus Lec., Ann. Lyc. 5, 128.....Warner's.
rimatus Lec., Pr. Acad. 7, 223.....Ar.
subcostatus Lec., Pr. Acad. 6, 446.....Tex.
parallelus Lec., Ann. Lyc. 5, 128.....Vall.
muricatus Lec., Ann. Lyc. 5, 129.....SD.
carinatus Lec., Ann. Lyc. 5, 128.....S. Felipe.
morbillosus Lec., Pr. Acad. 1858, 74.....Ar.
æger Lec., Journ. Acad. 2d ser. 4, 19.....Llano Est.
irregularis Lec., Journ. Acad. 2d ser. 4, 19.....Llano Est.
costipennis Lec., Journ. Acad. 2d ser. 4, 20.....Ar.
sordidus Lec., Pr. Acad. 6, 446.....Ar. (K. Z.)
angulatus Lec., Ann. Lyc. 5, 127.....SD.
- Euschides Lec.*
obovata Lec., Ann. Lyc. 5, 127.....Ar.
convexicollis Lec., Pr. Acad. 7, 224.....Ar.
lirata Lec., Pr. Acad. 7, 223.....Ar.
opaca Lec., Ann. Lyc. 5, 127.....Ar. Kz.
Asida opaca Say, Journ. Acad. 3, 254.
- Zopherus Gray.*
nodulosus Solier, Ann. Ent. Fr. 10, 43.....Tex.
Zopherus variolosus† Hald., Stansbury's Exp. 376.
tristis Lec., Ann. Lyc. 5, 130.....Col.
- Nosoderma Esch.*
diabolicum Lec., Ann. Lyc. 5, 130.....Col.
- Eleodes Esch.*
subnitens Lec., Ann. Lyc. 5, 134.....Ar.
extricata Lec......Ar.
Blaps extricata Say, Journ. Acad. 3, 261.
seriata Lec., Pr. Acad. 1858, 185.....Tex.
debilis Lec., Pr. Acad. 1858, 185.....Ar. (Santa Fe.)
gentilis Lec., Pr. Acad. 1858, 187.....SD.
longicollis Lec., Ann. Lyc. 5, 134.....Ar.
gigantea Mann. Bull. Mosc. 1843, 267.....SD.
ventricosa Lec., Pr. Acad. 1858, 186.....Tex.
soror Lec., Pr. Acad. 1858, 185.....Tex.
striolata Lec., Pr. Acad. 1858, 185.....Tex.
immunis Lec., Pr. Acad. 1858, 186.....Ar.
carbonaria Lec......Ar. Kz.
Blaps carbonaria Say, Journ. Acad. 3, 260.
omissa Lec., Pr. Acad. 1858, 186.....SD.
quadricollis Esch., Zool. Atl. 3, 12, tab. 14, f. 5.....SD. Vall.
vicina Lec., Ann. Lyc. 5, 138.....Ar.
armata Lec., Ann. Lyc. 5, 134.....Col.
- femorata Lec.*, Ann. Lyc. 5, 134.....SD.
dentipes Esch., Zool. Atl. 3, 10, tab. 14, f. 4.....SD.
laticollis Lec., Ann. Lyc. 5, 135.....SD.
acuticauda Lec., Ann. Lyc. 5, 135.....SD.
nupta Lec., Pr. Acad. 1858, 183.....Tex.
gracilis Lec., Pr. Acad. 1858, 184.....Ar.
arata Lec., Pr. Acad. 1858, 182.....Ar.
acuta Lec.,Tex.
Blaps acuta Say, Journ. Acad. 3, 257.
texana Lec., Pr. Acad. 1858, 182.....Tex.
pedinoides Lec., Pr. Acad. 1858, 183.....Tex.
asperata Lec., Pr. Acad. 1858, 183.....Tex.
robusta Lec., Pr. Acad. 1858, 184.....Tex.
tricostata Lec......Tex. Kz.
Blaps tricostata Say, Journ. Acad. 3, 262.
consobrina Lec., Ann. Lyc. 5, 135.....SI.
? depressa Lec., Ann. Lyc. 5, 135.....Vall.
- Embaphion Say.*
concauum Lec., Pr. Acad. 6, 446.....Tex.
contusum Lec., Journ. Acad. 2nd ser. 4, 40.....Ar. Kz.
- Amphidora Esch.*
osculans Lec., Ann. Lyc. 5, 136.....SD.
rufipes Lec., Ann. Lyc. 5, 136.....SD.
attenuata Lec., Ann. Lyc. 5, 137.....Vall.
- Helops Fabr.*
farcta Lec., Pr. Acad. 158, 74.....Tex.
- Apocrypha Esch.*
anthicoides Esch., Zool. Att. 4, 13, tab. 18, f. 7.....SD.
- Cononotus Lec.*
sericans Lec., Ann. Lyc. 5, 137.....SD.
- Coniontis Lec.*
viatica Esch. Zool. Att. 3, 7, tab. 14, f. 3.....SD.
subpubescens Lec., Ann. Lyc. 5, 131.....SD.
- Eusattus Lec.*
reticulatus Lec......Ar. Kz.
Zophos reticulata Say, Journ. Acad. 3, 250.
difficilis Lec., Ann. Lyc. 5, 132.....Col.
dilatatus Lec., Ann. Lyc. 5, 132.....Col.
puberulus Lec., Pr. Acad. 7, 84.....Tex.
productus Lec., Journ. Acad. 2nd ser. 4, 20.....Ar.
sulcatus Lec., Ann. Lyc. 5, 145.....SD.
granulatus Lec., Ann. Lyc. 5, 145.....Col.
- Conibius Lec.*
parallelus Lec., Ann. Lyc. 5, 146.....Vall.
- Blapstinus Waterhouse.*
?crassus Lec., Ann. Lyc. 5, 146.....SD.
?sordidus Lec., Ann. Lyc. 5, 146.....Col. Ar.
dilatatus Lec., Ann. Lyc. 5, 146.....SD. Ar. Tex.
brevicollis Lec., Ann. Lyc. 5, 147.....Ar. San Felipe.
longulus Lec., Ann. Lyc. 5, 147.....Ar.
angustus Lec., Ann. Lyc. 5, 147.....Col.
pubescens Lec., Ann. Lyc. 5, 147.....Col.
sulcatus Lec., Ann. Lyc. 5, 147.....San Felipe.
Opatrinus Latr.
aciculatus Lec., Pr. Acad. 1858, 75.....Tex.

- Cerenopus* Lec.
concolor Lec., Ann. Lyc. 5, 143.....Vall.
bicolor Lec., Ann. Lyc. 5, 143.....Vall.
sulcipennis Lec., Ann. Lyc. 5, 143.....Son.
Eulabis Esch.
pubescens Lec., Ann. Lyc. 5, 144.....SD.
Epantius Lec.
obscurus Lec., Ann. Lyc. 5, 144.....SD.
Bius Muls.
estriatus Lec.,.....SD.
Tenebrio estriatus Lec., Ann. Lyc. 5, 149.
Ulo ma Redt. (?)
marginata Lec., Ann. Lyc. 5, 149.....Col.
Tenebrio Linn.
tenebrioides Lec.,.....Tex.
Helops tenebrioides Beauv., Ins. 121, tab. 30, f. 3.
Glyptotus Esch.
cribratus Lec., Pr. Acad. 1858, 75Tex.
Nyctobates Esch.
intermedia Lec.,.....Tex.
Iphthinus intermedius Hald., Stansb. Exp. 367.
Cœlocnemis Mann.
obesa Lec., Ann. Lyc. 5, 150.....SI.
Adelina.
plana Lec., Ann. Lyc. 5, 150.....Col.
pallida Lec., Pr. Acad. 7, 119.....Tex.
Pytho pallida Say, Journ. Acad. 3, 271.
Oplocephala Lap.
viridipennis Lap., Ann. Sc. Nat. 23, 340.....Tex.
Platydemia Lap.
angustum Lec., Ann. Lyc. 5, 149.....Col.
flavipes Lap., Ann. Sc. Nat. 23, 388.....Col. NY.
Diaperis flavipes Fabr. Syst. El. 2, 567.
ruficornis Hald., Journ. Acad. 2d ser. 1, 101.....Tex. NY.
Diaperis ruficornis Sturm., Cat. 1826, 58, tab. 3, f. 21.
Platydemia rufiventris Lap., Ann. Sc. Nat. 23, 378.
Phaleria Latr.
rotundata Lec., Ann. Lyc. 5, 148.....SD.
Prionychus Sol.
gracilis Lec.,.....SD.
Stenochia gracilis Lec., Ann. Lyc. 5, 150.
Allecula Fabr.
socia Lec., Pr. Acad. 7, 84.....Tex.
MELANDRYADÆ.
Eustrophus Illiger.
indistinctus Lec., Ann. Lyc. 5, 151.....Col.
PYROCHROIDÆ.
Eurygenius Ferté.
constrictus Lec., Ann. Lyc. 5, 151.....SD.
ANTHICIDÆ.
Notoxus Geoffr.
conformis Lec., Journ. Acad. 2d ser. 1, 152.....G.
monodon Ferté, Mon. Anthic. 37.....Col. NY.
Anthicus monodon Fabr., Syst. El. 1, 280.
Pilati Ferté, Mon. Anthic. 297.....Tex.
angustatus Ferté, ibid. 308.
Anthicus Fabr.
mundus Lec., Pr. Acad. 6, 95.....Col.
Formicilla munda Lec., Ann. Lyc. 5, 152.
tenuis Lec., Ann. Lyc. 5, 153.....Col.
impressipennis Ferté, Mon. Anthic. 300.....Tex.
annectens Lec., Ann. Lyc. 5, 153.....SD.
californicus Ferté, Mon. Anthic. 128.....SD.
texanus Ferté, Mon. Anth. 301.....Tex.
lætus Ferté, Mon. Anth. 157.....Tex.
confinis Lec., Ann. Lyc. 5, 153.....SD.
horridus Lec., Ann. Lyc. 5, 154.....G.
cribratus Lec., Pr. Acad. 6, 98.....SI.
luteolus Lec., Ann. Lyc. 5, 154.....SD. Col.
nanus Lec., Ann. Lyc. 5, 156.....SD.
bellulus Lec., Ann. Lyc. 5, 156SD.
corticallis Lec., Ann. Lyc. 5, 154.....Col.
maritimus Lec., Ann. Lyc. 5, 156.....SD.
Tanarthrus Lec.
salinus Lec., Ann. Lyc. 5, 156.....Col.
alutaceus Lec., Pr. Acad. 6, 104.....SD. Col.
Anthicus alutaceus Lec., Ann. Lyc. 5, 156.
MORDELLIDÆ.
Anaspis Latr.
lætula Lec., Pr. Acad. 1858, 76Tex.
collaris Lec., Ann. Lyc. 5, 157.....SD.
pusio Lec., Proc. Acad. 1858, 76.....Col.
Mordella Linn.
comata Lec., Proc. Acad. 1858, 75.....Col.
scutellaris Fabr. Syst. El. 2, 123.....SD. NY.
vilis Lec., Proc. Acad. 1858, 76SD.
nubila Lec., Proc. Acad. 1858, 76.....SD.
Rhipiphorus Fabr.
rufus Lec., Proc. Acad. 7, 224.....Ar.
puncticeps Lec., Journ. Acad. 2nd ser. 4, 20Llano Est.
Sayi Lec., Journ. Acad. 2nd ser. 4, 21.....Llano Est.
Rhipiphorus bicolor|| Say, Jour. Acad. 3, 275.
MELOIDÆ.
Meloe Linn.
sublævis Lec., Proc. Acad. 7, 84.....Ar. N. Mex.
Cysteodemus Lec.
cancellatus Lec., Proc. Acad. 7, 224.....Ar. Mex.
Meloe cancellatus Br. & Er., Nov. Act. C. L. C. 17,
161, tab. 8, f. 9.
vittatus Lec., Proc. Acad. 6, 330.....Ar.
Wislizeni Lec., Ann. Lyc. 5, 158.....Ar.
armatus Lec., Ann. Lyc. 5, 158.....Col.
Henous Hald.
confertus Lec., Proc. Acad. 6, 330.....Tex. Kz.
Meloe confertus Say, Jour. Acad. 3, 281.
Henous techanus Hald. Stansbury's Exp. 377,
tab. 9, f. 12-14.
Eupompha Lec.
fissiceps Lec., Journ. Acad. 2nd ser. 4, 21.....Llano Est.
Lytta Linn.
vulnerata Lec., Proc. Acad. 6, 331.....SD.
Cantharis vulnerata Lec., Ann. Lyc. 5, 159.
cribrata Lec., Proc. Acad. 6, 447.....Tex.

cardinalis Chev., Col. Mex. cent. 1am.Tex.
Lytta fulvipennis Lec., Proc. Acad. 6, 331.
melæna Lec., Proc. Acad. 1858, 76.Ar.
dichroa Lec., Proc. Acad. 6, 332.Tex.
nitidicollis Lec., Proc. Acad. 6, 332.SD.
Cantharis nitid. Lec., Ann. Lyc. 5, 160.
tenebrosa Lec., Proc. Acad. 6, 333.SD.
Cantharis tenebr. Lec. Ann. Lyc. 5, 160.
æneipennis Lec., Proc. Acad. 6, 334.SI.
Cantharis æneipennis Lec., Ann. Lyc. 5, 160.
smaragdula Lec., Proc. Acad. 6, 334.Vall.
lugens Lec., Proc. Acad. 6, 335.SD.
Cantharis lugens Lec., Ann. Lyc. 5, 161.
convexa Lec., Proc. Acad. 6, 336.Tex.
filiformis Lec., Proc. Acad. 6, 337.Tex.
Cantharis filiformis Lec., Jour. Ac. 2d ser. 1, 91.
insulata Lec., Journ. Acad. 2nd ser. 4, 22.Llano Est.
mylabrina Lec., Proc. Acad. 6, 337.Tex.
Pyrota mylabrina Chev., Col. Mex. cent. 1ma.
vittigera Lec., Journ. Acad. 2nd ser. 4, 22.Tex.
discoidea Lec., Proc. Acad. 6, 338.Tex. Kz.
puncticollis Lec., Proc. Acad. 6, 338.SD.
Epicauta puncticollis Mann., Bull. Mosc. 1843, 288.
maura Lec., Proc. Acad. 6, 339.SD.
Epicauta maura Lec. Ann. Lyc. 5, 162.
morio Lec., Proc. Acad. 6, 447.Tex.
corvina Lec., Journ. Acad. 2nd ser. 4, 21.Ar.
tenella Lec., Journ. Acad. 2nd ser. 4, 23.Llano Est.
conspersa Lec., Proc. Acad. 6, 340.Tex.
linearis Lec., Journ. Acad. 2nd ser. 4, 23.Llano Est.
costata Lec., Proc. Acad. 7, 84.Fr.
ferruginea Say, Journ. Acad. 3, 298.Tex.
Cantharis nigricornis Mels. Pr. Acad. 3, 53.
elegans Lec., Pr. Acad. 6, 341.SD.
Epicauta elegans Lec., Ann. Lyc. 5, 161.
erosa Lec., Pr. Acad. 6, 334.SD.
Tegrodera erosa Lec., Ann. Lyc. 5, 159.
id. var. ?Ar?
valida Lec.Tex.
Lytta segmentata† (var.) Lec., Pr. Acad. 6, 342.
fulvescens Lec. Pr. Acad. 6, 447.Tex.
immaculata Say, Journ. Acad. 3, 304.Tex.
Lytta articularis Say, *ibid.*
sublineata Lec., Pr. Acad. 6, 447.Tex.
longicollis Lec., Pr. Acad. 6, 343.Tex.
ochrea Lec., Pr. Acad. 6, 342.Tex.
albida Say, Journ. Acad. 3, 305.Tex.
luteicornis Lec., Pr. Acad. 7, 84.Tex.
atrivittata Lec., Proc. Acad. 7, 224.Tex.
torsa Lec., Proc. Acad. 6, 343.Tex.

Phodaga Lec.

alticeps Lec., Proc. Acad. 1858, 77.Ar.

Tetraonyx Latr.

fulva Lec., Proc. Acad. 6, 344.Fr.

Nemognatha Illiger.

apicalis Lec., Proc. Acad. 6, 345.Cal. Oregon, Tex.
lurida Lec., Proc. Acad. 6, 345.Tex. Kz.
pallens Lec., Proc. Acad. 6, 346.Vall.
lutea Lec., Proc. Acad. 6, 346.Tex.
discolor Lec., Proc. Acad. 1858, 77.Tex.

piezata Lec., Proc. Acad. 6, 347.Tex.
Zonitis piezata Fabr., Ent. Syst. Suppl. 104.
Zonitis vittata Fabr., Syst. El. 2, 24.

texana Lec., Proc. Acad. 6, 347.Tex.
cribricollis Lec., Proc. Acad. 6, 348.Tex.
longicollis Lec., Proc. Acad. 1858, 77.Tex.
flavicollis Lec., Journ. Acad. 2nd ser. 4, 23.Tex.

Zonitis Fabr.

rufa Lec., Proc. Acad. 7, 85.Tex.

CEDEMERIDÆ.

Asclera Schmidt.

excavata Lec., Ann. Lyc. 5, 158.SD.
pallida Lec., Proc. Acad. 7, 224.Ar.
cana Lec., Proc. Acad. 7, 224.Ar.
dorsalis Lec., Proc. Acad. 7, 21.Tex. SC.
Nacerdes dorsalis Mels. Proc. Acad. 3, 55.
Xanthochroa vittata Hald., Journ. Acad. 2d ser. 1, 96.

CURCULIONIDÆ.

Bruchus Linn.

uniformis Lec., Proc. Acad. 1858, 77.Col.
prosopis Lec., Proc. Acad. 1858, 77.Col.
desertorum Lec., Proc. Acad. 1858, 78.Col.
obtectus Say, Curc. 1.Tex.
pauperculus Lec., P. R. R. 47°, 52.SD.

Apion Herbst.

ædorhyncum Lec., Proc. Acad. 1858, 78.SD.
troglodytes Mann., Bull. Mosc. 1843, 289.SD.
ventricosum Lec., Proc. Acad. 1858, 78.Col.

Ophryastes Schönh.

validus Lec., Proc. Acad. 7, 225.Ar.
vittatus Schönh., Curc. 1, 509; 5, 819.Tex. Kz.
Liparus vittatus Say, Journ. Acad. 3, 316.
speciosus Lec., Proc. Acad. 6, 444.Tex.
argentatus Lec., Proc. Acad. 6, 444.Vall.
varius Lec., Proc. Acad. 6, 444.Col.
porosus Lec., Proc. Acad. 7, 225.Ar.
decipiens Lec., Proc. Acad. 6, 445.Tex.

Platymus Schönh.

auriceps Sch., Curc. 6, 183.Tex. Kz. Mex.
Curculio auricephalus Say, Journ. Acad. 3, 310.

Tanymecus Germ.

lautus Lec., Proc. Acad. 7, 85.Fr.

Sitones Germ.

scissifrons Say, Curc. 10.Tex.
vittatus Lec., P. R. R. 47°, 54.SD.
sordidus Lec., *ibid.* 54.SD.

Eudiagogus Schönh.

pulcher Sch., Curc. 6, 2, 310.Tex.

Cleonus Schönh.

molitor Lec., Pr. Acad. 1853, 78.Col. Ar.

Epicærus Schönh.

imbricatus Sch., Curc. 6, 280.Tex.
Liparus imbricatus Say, Journ. Acad. 3, 317.

Emphyastes Mann.

fucicola Mann. (var?) Bull. Mosc. 1852, 354.SD.

- Lixus Fabr.*
pleuralis Lec., Pr. Acad. 1858, 78.....Col.
læscollis Lec., Pr. Acad. 1858, 78.....Tex.
- Anthonomus Germ.*
fulvus Lec., Pr. Acad. 1858, 79.....Tex.
scutellaris Lec., Pr. Acad. 1858, 79.....Tex.
- Balaninus Germ.*
nasicus? Sch. Curc. 16.....Tex.
- Baridius Schönh.*
mucoreus Lec., Pr. Acad. 1858, 79.....Col.
densus Lec., Pr. Acad. 1858, 79.....SD.
carinulatus Lec., Pr. Acad. 1858, 79.....Tex.
- Rhyssematius Schönh.*
lineaticollis Sch. Curc. 8, 9.....Tex. Mo.
Rhynchæus lineaticollis Say, Journ. Acad. 3, 113.
- Cratosomus Schönh.*
gemmatus Lec., Pr. Acad. 1858, 79.....Tampico.
- Conotrachelus Latr.*
argula Sch., Curc. 4, 425.....Tex.
Rhynchæus argula Fabr.
Curculio nenuphar Herbst.
Rhynchæus cerasi Peck.
- Scyphophonus Sch.*
acupunctatus Sch. Curc. 4, 857.....Tex. Mex.
- Sphenophorus Schönh.*
validus Lec., Pr. Acad. 1858, 80.....Ar.
procerus Lec., Pr. Acad. 1858, 80.....SD.
pictus Lec., Pr. Acad. 1858, 80.....Vall.
ochreus Lec., Pr. Acad. 1858, 80.....Ar.
vomerinus Lec., Pr. Acad. 1858, 81.....Ar.
- Rhyncolus Creutzer.*
dorsalis Lec., Pr. Acad. 1858, 81.....SD.
angularis Lec., Pr. Acad. 1858, 81.....Col.
- Hylesinus Fabr.*
hystrix Lec., Pr. Acad. 1858, 81.....SD.
- CERAMBYCIDÆ.
Mallodon Serv.
dasystemus Hald., Tr. Am. Phil. Soc. 10, 31.....Tex. Ga.
Prionus dasystemus Say, Journ. Acad. 3, 326.
Mallodon melanopus† Hald., Tr. Am. Phil. Soc. 10, 30.
serrulatus Lec., Pr. Acad. 7, 82.....Tex.
gnatho Lec., Pr. Acad. 1858, 81.....Ar.
- Derobrachus Serv.*
geminatus Lec., Pr. Acad. 6, 233.....Tex.
- Prionus Geoffr.*
fissicornis Hald., Pr. Acad. 3, 125.....Tex. Kz.
- Callidium Fabr.*
ianthinum Lec., Journ. Acad. 2d ser. 2, 34.....Tex.
- Eburia Serv.*
Haldemani Lec., Journ. Acad. 2nd ser. 2, 102.....Tex.
mutica Lec., Pr. Acad. 6, 233.....Tex. Mex.
manca Lec., Journ. Acad. 2nd ser. 4, 24.....Tex.
- Cerasphorus Serv.*
cinctus Lec......Tex.
Cerambyx cinctus Drury, Ins. 1, 85.
Stenocorus gurganicus Fabr., Syst. El. 2, 305.
Cerambyx balteatus De Geer, 5, 111.
Stenocorus rusticus Fabr. Syst. El. 2, 311.
- Elaphidion Serv.*
mucronatum Hald., Tr. Am. Phil. Soc. 10, 33.....Tex.
Stenocorus mucronatus Say, Journ. Acad. 3, 427.
- atomarium Lec.*.....Tex.
Cerambyx atomarius Drury, Ins. 1, 93.
Cerambyx pulverulentus De Geer, 5, 118.
Stenocorus marylandicus Fabr., Syst. El. 2, 306.
- tæniatum Lec.*, Pr. Acad. 7, 81.....Tex.
validum Lec., Proc. Acad. 1858, 82.....Tex.
mœstum Lec., Proc. Acad. 6, 442.....Tex.
spureum Lec., Proc. Acad. 6, 442.....Tex.
debile Lec., Proc. Acad. 6, 442.....Tex.
protensum Lec., Proc. Acad. 1858, 82.....Ar.
tenue Lec., Proc. Acad. 7, 81.....Tex.
- Mannophorus Lec.*
lætus Lec., Proc. Acad. 6, 442.....Tex.
- Amannus Lec.*
vittiger Lec., Journ. Acad. 2nd ser. 4, 24.....Llano Est.
pectoralis Lec., Journ. Acad. 2nd ser. 4, 25.....Col.
- Eriphus Serv.*
signicollis Say, (Callidium) Jour. Acad.Col.
Callidium sanguinicolle Germ. Ins. Nov. 515.
fruber Lec., Proc. Acad. 1858, 82.....Tex.
- Arhophalus Serv. (emend. Lec.)*
pictus Lec......Tex.
Cerambyx pictus Drury, Ins. 1, 92.
Leptura robinæ Forster, Cent. Ins. 43.
Clytus flexuosus Fabr. Syst. El. 2, 345.
- erythropus Lec.*.....Tex.
Clytus erythropus Chev., Col. Mex. Cent.
eurystethus Lec., Proc. Acad. 1858, 82.....Ar.
- Megaderus Dup.*
bifasciatus Dupont, Mag. Zool. 1836, tab. 141.....Tex.
Megaderus corallifer Newm., Mag. Nat. Hist. 4, 185.
- Dendrobis Dup.*
mandibularis Serv., Ann. Ent. Soc. Fr. 3, 42.....Tex. Ar.
quadrinaculatus Dupont, Mag. Zool. 1836.
- Stenaspis Dup.*
verticalis Dupont, Serv. Ann. Ent. Soc. Fr. 3, 53; Du-
 pont, Mag. Zool. 1858, 51, tab. 216, f. 1.....Ar.
solitaria Lec., Proc. Acad. 6, 441.....Tex. Ar. Kz.
Cerambyx solitarius Say, Journ. Acad. 3, 410.
Smileceras solitarium Lec. Proc. Acad. 2d ser. 2, 9.
splendens Lec., Proc. Acad. 6, 441.....Tex.
- Sphenothecus Dupont.*
bivittatus Dupont, Mag. Zool. 1838, 58, tab. 220....Tex.
cyanicollis Dupont, ibid. " ".....Tex.
suturalis Lec., Journ. Acad. 2nd ser. 4, 25.....Llano Est.
- Tylosis Lec.*
maculatus Lec., Journ. Acad. 2nd ser. 2, 9.....Ar.
sellatus Lec., Journ. Acad. 2nd ser. 4, 25.....Llano Est.
oculatus Lec., Journ. Acad. 2nd ser. 2, 9.....Tex. Mex.
- Perarthrus Lec.*
vittatus Lec., Journ. Acad. 2nd ser. 2, 102.....SD.
- Crossidius Lec.*
testaceus Lec. Journ. Acad. 2nd ser. 2, 102.....SD. Col.
suturalis Lec., Pr. Acad. 1858, 38.....Ar.
humeralis Lec., Journ. Acad. 2nd ser. 4, 25.....Llano Est.

Tragidion Serv.

coquus.....Tex. Md.
Cerambyx coquus Linn.

Lamia coquus Fabr., Syst. El. 2, 300.

Callidium lynceum Fabr. Syst. El. 2, 300.

Purpuricenus Melsheimeri Germ., Ins. Nov. 502.

Callidium fulvipenne Say, Journ. Acad. 3, 414.

Tragidion lynceum Serv., Ann. Ent. Soc. Fr. 3, 90.

annulatum Lec., Pr. Acad. 1858, 83.....Ar.

armatum Lec., Journ. Acad. 2nd ser. 4, 25.....Llano Est.

Rhopalophorus Serv.

rugicollis Lec., Pr. Acad. 1858, 83.....Tex.

Callichroma Serv.

plicatum Lec., Pr. Acad. 6, 233.....Tex.

Clytus Fabr.

fuscus Fabr., Syst. El. 2, 347.....Tex. Ar. NY.

Clytus humeralis Newman, Ent. Mag. 5, 394.

scutellaris Lap., Mon. Clyt. 53, tab. 11, f. 62.....Tex. NY.

Callidium scutellare Oliv., Ins. 70, 51, tab. 5, f. 52.

erythrocephalus Fabr. Syst. El. 2, 350.....Tex. NY.

irroratus Lec., Journ. Acad. 2nd ser. 4, 26.....Tex.

nauticus Mann. Bull. Mosc. 1843, 305.....SD.

Clytus gramineus Hald., Tr. Am. Phil. Soc. 10, 40.

colonus Fabr., Syst. El. 2, 345.....Tex. NY.

Typocerus Lec.

sinuatus Lec., Journ. Acad. 2nd ser. 1, 335.....Tex. Kz.

Leptura sinuata Newman, Entom. 70.

Stenura octonotata Hald., Tr. Am. Phil. Soc. 10, 62.

Leptura Linn.

emarginata Fabr., Syst. El. 2, 256.....Tex. NY.

Ipochus Lec.

fasciatus Lec., Journ. Acad. 2nd ser. 2, 169.....Vall.

Monilema Say.

apressum Lec., Journ. Acad. 2nd ser. 2, 168.....Ar.

armatum Lec., Pr. Acad. 6, 234.....Tex.

crassum Lec., Pr. Acad. 6, 234.....Tex.

albopictum White, Pr. Zool. Soc. 1856, 407, t. 40, f. 7.....Tex.

Monilema albotessellata Thomson, Arch. Ent. 1, 189.

Oberea Muls.

oculaticollis Lec.....Llano Est.

Saperda oculaticollis Say, Journ. Acad. 3, 406.

Tetraopes Dalman.

discoideus Lec., Journ. Acad. 2nd ser. 4, 26.....Llano Est.

basalis Lec., Jour. Acad. 2d ser. 2, 157.....Tex. Cal.

quinquemaculatus Hald., Tr. Am. Phil. Soc. 10, 53.....Tex.

Stenosoma Muls.

sordida Lec., Jour. Acad. 2d ser. 2, 158.....Tex.

Ataxia sordida Hald., Tr. Am. Phil. Soc. 10, 56.

Oncideres Serv.

pustulatus Lec., Proc. Acad. 7, 82.....Tex.

CHRYSOMELIDÆ.

Lema Fabr.

trilineata Dej., Cat. 386.....Tex.

Crioceris trilineata Oliv., Ent. 94, 739; t. 2, f. 20.

collaris Say, Jour. Acad. 3, 430.....Tex.

Clythra Fabr.

mutabilis Lac., Col. Subpent. 2, 137.....Tex.

militaris Lec., Proc. Acad. 1858, 83.....Tex.

Euryscopa Lac.

scapularis? Lac., Col. Subpent. 2, 505.....Son.

æneipennis Lec., Jour. Acad. 2d ser. 4, 26.....Llano Est.

vittata Lec., Jour. Acad. 2d ser. 4, 26.....Llano Est.

Coscinoptera Lac.

mucorea Lec.....Val.

Megalostomis mucorea Lec., Proc. Acad. 1858, 83.

Babia Lac.

tetraspilota Lec., Proc. Acad. 1858, 83.....Col.

Cryptocephalus Geoffr.

spurcus Lec., Proc. Acad. 1858, 84.....SD.

sanguinicollis Suffrian, Linn. Ent. 7, 78.....SD.

auratus Fabr., Syst. El. 2, 57.....SD. Col.

chalconatus Mann., Bull. Mosc. 1843, 312.....SD.

Pachybrachus Suffrian.

livens Lec., Proc. Acad. 1858, 84.....Col.

cælatus Lec., Proc. Acad. 1858, 84.....SD. Col.

hybridus Suffrian, Linn. Ent. 7, 157.....SD.

Doryphora Fabr.

Rogersii Lec., Jour. Acad. 2d. ser. 4, 26.....Tex. Kz.

decemlineata Say, Journ. Acad. 3, 453.....Tex.

rubiginosa Rogers, Proc. Acad. 7, 30.....Tex.

Haldemani Rogers, Proc. Acad. 7, 30.....Tex.

Chrysomela Linn.

serpentina Rogers, Proc. Acad. 7, 32.....Tex. Ar.

dislocata Rogers, Proc. Acad. 7, 32.....Tex.

tortuosa Rogers, Proc. Acad. 7, 32.....Tex.

disrupta Rogers, Pr. Acad. 7, 34.....Tex.

auripennis Say, Jour. Acad. 3, 452.....Tex. Ill.

Colaspis Fabr.

humeralis Lec., Pr. Acad. 1858, 85.....Tex.

Metachroma Lec.

ustum Lec., Pr. Acad. 1858, 85.....Ar.

suturale Lec., Pr. Acad. 1858, 85.....Tex.

puncticolle Lec., Pr. Acad. 1858, 85.....Tex.

Eumolpus Fabr.

cuprascens Lec. Pr. Acad. 1858, 85.....SD.

Paria Lec.

quadriguttata Lec., Pr. Acad. 1858, 86.....Col.

Chrysochus Redt.

cobaltinus Lec., P. R. R. 47°, 67.....SD.

Myochrous.

longulus Lec., Pr. Acad. 1858, 86.....Col.

denticollis Lec.....El Paso.

Colaspis denticollis Say, Journ. Acad. 3, 448.

Oedionychis Latr.

gibbitarsa Lec.....Tex. Kz.

Altica gibbitarsa Say, Jour. Acad. 4, 83.

Haltica Ill.

discoidea Illiger, Mag. 6, 143.....Tex.

Chrysomela discoidea Fabr., Syst. El. 1, 445.

fumata Lec., Proc. Acad. 1858, 86.....Tex.

pluriligata Lec., Jour. Acad. 2nd ser. 4, 27.....Tex.

pura Lec., Proc. Acad. 1858, 86.....Col.

glabrata Illiger, Mag. 6, 146.....Tex.

Galleruca glabrata Fabr., Syst. El. 1, 494.

californica Mann., Bull. Mosc. 1843, 310.....Warner's.
foliacea Lec., Pr. Acad. 1858, 86.....Tex.
torquata Lec., Jour. Acad. 2d ser. 4, 27.....Col.
opulenta Lec., Pr. Acad. 1858, 86.....Col.
mitis Lec., Pr. Acad. 1858, 87.....Col.
ochracea Lec., Pr. Acad. 1858, 87.....SD.
albionica Lec., P. R. R. 47°, 68.....SD.
lepidula Lec., P. R. R. 47°, 68.....SD.

Longitarsus Latr.

mancus Lec., Pr. Acad. 1858, 87.....G.
apterus Lec., Pr. Acad. 1858, 87.....G.
repandus Lec., Pr. Acad. 1858, 87.....SD.
livens Lec., Pr. Acad. 1858, 87.....Col.

Psylliodes Lutr.

interstitialis Lec., Pr. Acad. 1858, 87.....Col.

Diabrotica.

tricincta Lec.....Ar. Kz.
Galleruca tricincta Say, Journ. Acad. 3, 457.
duodecim-punctata.....SD. Tex. Ar. NY.
Crioceris 12-punctata Fabr., Syst. El. 1, 457.
tenella Lec., Proc. Acad. 1850, 88.....SD.
? fossata Lec., Proc. Acad. 1858, 88.....Tex.

Galleruca Geoff.

sordida Lec., Proc. Acad. 1858, 88.....Col.
luteocincta Lec., Proc. Acad. 1858, 88.....SD.

Microhophala.

rubrolineata Lec.....SD.
Odontota rubrolineata Mann. Bull. Mosc. 1843, 307.

COCCINELLIDÆ.

Hippodamia Muls.

convergens Guér., Icon R. An. 321.....Tex. Ar. NY.
Coccinella modesta Mels., Proc. Acad. 3, 178.
maculata Lec.....Col. Ar. NY. Europe.
Coccinella maculata De Geer, 5, 392.
Megilla maculata Muls. Cocc, 28.
Coccinella 10-maculata Fabr., Syst. El. 1, 367.
Coccinella oblonga Oliv., Enc. Méth. 5, 61.

Coccinella Linn.

californica Mann., Bull. Mosc. 1843, 313.....SD.
munda Say, Bost. Jr. Nat. Hist. 1, 202.....Tex. NY.
binotata Say, Jour. Acad. 5, 302.....Ar. Ga.
abdominalis Say, Journ. Acad. 4, 95.....Tex. Col. NY.

Exochomus Redt.

texanus Lec., Proc. Acad. 1858, 88.....Tex.

Chilocorus Leach.

bivulnerus Muls., Cocc, 460.....Tex. NY.

Brachiacantha Muls.

quadrillum Lec., Proc. Acad. 1858, 89.....Tex.

Hyperaspis Redt.

arcuata Lec., Proc. Acad. 6, 133.....Col.
tæniata Lec., Proc. Acad. 6, 134.....SD.
cincta Lec., Proc. Acad. 1858, 89.....SI.

Scymnus Kugellan.

nebulosus Lec., Proc. Acad. 6, 137.....Col.
suturalis Lec., Proc. Acad. 6, 138.....Col.
marginicollis Lec., Proc. Acad. 6, 140.....SD.

Epilachna Redt.

borealis Muls., Cocc. 326.....Tex.
Coccinella borealis Fabr., Syst. El. 1, 368.
mexicana Guér., Icon. R. An. 319; Muls. 731.....Tex.

Sacium Lec.

amabile Lec., Proc. Acad. 5, 144.....Col.
scitulum Lec., Proc. Acad. 6, 145.....Col.

ENDOMYCHIDÆ.

Epipocus Germ.

cinctus Lec., Proc. Acad. 6, 358.....Tex.
discoidalis Lec., Proc. Acad. 6, 358.....Tex.

Calyptribium Aubé.

one species.....Col.

REFERENCES TO PLATE IV.

- Fig. 1. *Lachnophorus elegantulus*.
 2. *Evarthrus heros*.
 3. ——— gravidus.
 4. *Pterostichus congestus*.
 5. *Stenomorphus rufipes*.
 6. *Melanotus erro*.
 7. *Dicælus costatus*.
 8. *Chlænienus posticus*.
 9. ——— cumatilis.
 10. *Pasimachus validus*.

11. *Pasimachus costifer*.
 11a. ——— id. var. (elytron.)
 12. *Acephorus marinus*.
 13. *Cychnus heros*.
 14. *Calosoma lugubre*.
 15. ——— macrum.
 16. *Aleochara valida*.
 17. *Monotoma marinum*.
 18. *Anchomma costatum*.
 19. *Phileurus cribrerosus*.

ART. III.—*Descriptions of the Embryonic Forms of Thirty-eight species of UNIONIDÆ.*

By ISAAC LEA, LL. D.

Among the numerous observers of the anatomy and habits of the family *Unionidæ*, very few have given any attention to their ovulation and incubation. Poli, Carus and Pfeiffer have given descriptions and figures of the ova and young of a few European species, but they have not observed the embryonic differences of the species, and it does not seem to have occurred to them, that there might be an essential difference in the various species in this important stage of existence.

I have occasionally, in some of my papers, described and figured the forms and condition of the *branchial uterus** of a number of species, but until within the last three years, I have not entered into the close examination of their embryonic state, and particularly at the period of the developement of the embryo when it is matured in the ovum, but still retained in the ovisacks of the branchial uterus† of the gravid parent.

*On a consultation with my friend, Dr. Leidy, we concluded, in order to avoid a confusion of names, and to make the terminology more specific, to adopt this name for those parts which have heretofore been called, we think erroneously, the *oviducts*, as the oviduct really forms only the means of passage of the mature ova to the organ, probably after it has received fecundation, ovulation having taken place in the ovarium.

†Prof. Agassiz, *Archiv für Naturgeschichte*, 1852, page 44, in referring to my figures of the *branchial uterus* (so-called oviducts,) in several species of the *Unionidæ*, (*Trans. Am. Phil. Soc. New. Ser.*, vol. 6, pl. 15,*) states that "the ovisacks (eiersäcken) give a bad idea, because the connection of these sacks (which he calls oviducts) with the gills is entirely overlooked, and in the figure itself, which is intended to represent the entire animal, there are no gills present."

Now all the above criticisms are totally incorrect. The specimens were carefully prepared by me to show *expressly* the different forms of the so-called *oviducts* and their connection with the branchiæ in several of our Pennsylvania species. My artist, Mr. Drayton, who was subsequently artist to the Exploring Expedition under Capt. Wilkes, had no superior in this country, as the plates of the great work illustrating the Natural History of that voyage fully prove. In the four species of which the so-called oviducts are represented, they are distinct and well characterized, and I have stated in the text that "the oviduct will be found to be placed in the posterior portion of the branchiæ." Thus they are not only carefully figured on the plate, but they are expressly stated in the text, to be placed in the branchiæ, and yet Prof. Agassiz asserts that I have entirely overlooked this connection! It was not intended on my part, as asserted by Prof. Agassiz, to give "the whole animal;" the plate was made chiefly to give the form and connection of "oviducts and branchiæ." The mantle in each case was pushed back or cut off, to enable the artist to give the different forms of the oviducts perfectly, and their connection with the branchiæ, and they are so given. There was no great care taken to elucidate in this plate any other organs of these animals; the four principal drawings were made for the purpose of exhibiting the organs which he says I have "*entirely overlooked*," and the excellent artist succeeded admirably in representing them, and they do not "give a bad idea of the ovisack" (so-called oviducts) of the four species, but on the contrary a very correct idea, as any one at a glance can perceive.

* Observations on the Genus *Unio*, &c., vol. 2.

Having carefully examined the soft parts of many thousand specimens, living and preserved in alcohol, in every case I gave close attention to the condition of the female; and when I found the ova so much advanced as to give a determined form to the embryonic shell, I made enlarged drawings and careful descriptions. I soon found that these singular forms, so different from the adults of the same species, which are usually transversely oval, naturally arranged themselves into groups having outlines entirely different. Thus there were pouch-shape, subrotund, subtriangular and wedge shape outlines, the dorsal line being straight, or nearly so, and connecting the two valves the whole length of this margin. They seemed to be in no way analogous to the mature parent, except that they possessed two valves. In the plane of the outline there was no approximation in form. The base, in all the species, was either angular or rounded, and always presented the anterior and posterior margins equal, which is not the case with any of the species when fully grown. That is if a perpendicular line be raised from the middle of the basal margin to the middle of the dorsal line, the right and the left divisions will be exactly symmetrical. Most of the *Margaritanæ* and *Anodontæ* have a remarkable hook or spur on each valve, which, when the valves are closed, both these hooks are enclosed, and seem to be used for keeping the valves together. This hook is placed at the base or angle, directly opposed to the middle of the dorsal line; I have never observed this hook, which is always more or less granular or serrate on the outer side, except in the species which are, in this stage, sub-angular at the base. The species which are round or much curved at the base, never have it, so far as my observation has extended.

When the young are still within the branchial uterus,* but ready to come forth, their epidermis gives a color to it, and the young shell itself, when taken out, exhibits this color. In the *Anodontæ* and *Margaritanæ*, they are usually, but not always, of a light brown tint; some are whitish. The color of the branchial uterus of the *Unio* is usually white, and the epidermis of the young shell also. But this is not always so, for in some species they are found quite brown, as in the case of *Unio irroratus*† (nobis,) and some others.

Under the microscope, with a high power, the whole exterior surface of the valve, when taken out of the branchial uterus, will be found to be granulate. This condition is invariable in all the species of this family, so far as I have been able to observe them. In some cases these granules are closer and larger than in others, but they are exceedingly small; those of *Margaritana rugosa* being 0.0045 of a millimeter in diameter. They are attempted to be represented in the plate. The cluster of spots which is observed in nearly all the drawings, is not occasioned by these granules,

* There are some species which extrude the whole sack before the young are perfect in the ova. I mentioned this in Trans. Am. Phil. Soc., July, 1836, vol. vi., N. S.

† See Tr. Am. Phil. Soc., vol. iii., pl. 5, and Observations on the Genus *Unio*, vol. i., p. 11.

but I think, by the bundle of muscular fibre which, attached to the interior of the valves, serves to close them together. The adductor muscle is placed towards the dorsal margin, and consists of a single group, below the middle of the dorsal line. It is evident that at this period, the members of this family are *unimusculose*, afterwards becoming *bimusculose*. In this respect, they have some resemblance to the genus *Mulleria* (Fer.)=*Acostæa*, D'Orb.*

There is no doubt but that the young of some species are attached by a filament, which anchors them to the mother, or some permanent object, and this is probably the case with those of the whole family. During this period of anchorage, the single muscle which connects the two valves no doubt separates into two, removed, the one to become the anterior adductor, and the other the posterior adductor.

It will be observed that the figures, on the plate, of all the species have a double line along the margin. This is the case in all the young which I have examined in this state. In some it is broader than in others. It may be occasioned by the attachment of the pallear margin.

The spur or hook, which is mentioned on a previous page, is a very remarkable appendage to the embryonic shell. Existing only in the species which are angular at the base, with the exception of the two *Uniones*, represented as wedge-shape, and which have two angles; they bend inwards, and are flexible, and are not observable when the valves are closed, unless faintly through the diaphanous valve. They differ in some species in size, and slightly in form, and the outer side is furnished with two or more rows of apparently hard tubercles, extending from the base to the point. In *Margaritana rugosa*, the hook is about one-tenth of a millimetre in length. In some cases, these, when examined horizontally, will be observed to be serrate, as fig. 38 in the plate exhibits. In the two remarkable species represented as wedge-shape, *U. lævissimus*, (nobis,) and *U. alatus*, Say, at the two angles of the basal margin, there is a hook on each valve. There are, therefore in these, four to each individual. They are exceedingly minute, and could with difficulty be detected. No granulations could be distinguished on the hooks of these two species.

As regards the forms of the *branchial uterus* of different species, it is not my intention here to describe them. That part of the economy of this family will be fully entered into, when the soft part of the species are under consideration. Two *sacks*, taken from the branchial uterus of two species, are represented on the plate, fig. 16^a and fig. 38^d. They are both of unusual form, and the young represented of these two species were taken from these sacks.

The first, from *U. Woodwardianus*, is clavate, large and blunt at the inferior end and pointed at the superior one. It is represented here twice the natural length

* See Rev. and Mag. de Zool. vol. iii., p. 184, for genus *Acostæa*, D'Orb, and my observations on it, Journal Acad. Nat. Sci. Nov. 1851.

and belongs to a very remarkable form of branchial uterus. The latter, from *Anodonta undulata*, of which I described and figured the branchial uterus elsewhere,* is represented here five times the natural size. The sacks were extruded by the parent from day to day, for about a month, in the middle of winter. Eight or ten young were generally in each sack, but some sacks were so short as only to have room for one or two; these were marginal sacks. Immediately when the sacks came out from between the valves of the parent, most of the young were seen to be attached by the dorsal margin to the outer portion of the sack, as if it were a placenta. As represented here, the valves were usually open, and the hooks could be observed on every one of them.

It may be observed by the plate, that the most common form of the *embryonic Unio* is pouch-shape. From Nos. 1 to 20 they are of that form. No. 21 is subrotund. Nos. 22 and 23 are sub-triangular. Nos. 24 and 25 are wedge-shape. The most common form of the *Margaritanæ* is sub-triangular. Nos. 26 to 30 are of this form. No. 31 is subrotund. As regards the *Anodontæ*, those which I have observed in this condition, seven species, Nos. 32 to 38, are all subtriangular.

On pl. 5 will be found the following genera and species, at the period of their extrusion from the branchial uterus, when it is evident they are prepared to take care of themselves. They are enormously magnified, the natural size being from $\frac{1}{50}$ to $\frac{1}{100}$ of an inch in length. The exact measurements of four species, Nos. 1, 21, 24 and 26, are given below, where the diagnoses are given.

I am greatly obliged to many friends for the pains taken to send me living specimens, as well as those in alcohol, for the purpose of these examinations, and more particularly so to Bishop Elliot, J. H. Couper, and J. C. Plant, of Georgia, Dr. Lewis, of Mohawk, N. Y., J. Clark, of Cincinnati, H. Moores, of Columbus, Ohio, E. Billings, Ottawa, C. W., and Dr. Shurtleff, Mass.

UNIO OBTUSUS, Lea, pl. 5, fig. 1. Pouch-shape; dorsal line rather short; side margins flattened; basal margin gently curved; color clear white. Has no hooks.† Chattahoochee River, Georgia. Length 0.256 millimetres. Breadth 0.192 mm.

UNIO ANODONTOIDES, Lea, fig. 2. Pouch-shape; dorsal line rather long; side margins arcuate, sub-angular on both sides at the base; basal margin gently curved; color clear white. Has no hooks. Cincinnati, Ohio.

UNIO MULTIPLICATUS, Lea, fig. 3. Pouch-shape; dorsal line long; side margins slightly curved; basal margin rounded; color clear white. Has no hooks.‡ Cincinnati, Ohio.

UNIO RUTILANS, Lea, fig. 4. Pouch-shape; dorsal line long; side margins gently curved; basal margin slightly rounded; color clear white. Has no hooks. Baldwin County, Georgia.

* Trans. Am. Phil. Soc., vol. vi., p. 15, and Obs. on the Genus Unio, vol. ii. p. 52.

† The descriptions of the branchial uterus will be found elsewhere in these papers, where the diagnoses of the soft parts of these animals are given. The embryo did not appear to be perfect in this specimen.

‡ In this species the branchial uterus exists in *all four* leaves of the branchiæ.

- UNIO PENICILLATUS, Lea, fig. 5. Pouch-shape; dorsal line short; slightly rounded at the ends; side margins flattened above and curved below; basal margin semi-circular; color clear white. Has no hooks. Chattahoochee River, Georgia.
- UNIO SECURIS, Lea, fig. 6. Pouch-shape; dorsal line very short; slightly rounded at the ends; side margins flattened above and much curved below; basal margin nearly semi-circular; clear white. Has no hooks. Cincinnati, Ohio.
- UNIO RETUSUS, Lam., fig. 7. Pouch-shape; dorsal line short; side margins flattened; basal margin nearly semicircular; clear white. Has no hooks. Cincinnati, Ohio.
- UNIO PRATII, Lea, fig. 8. Pouch-shape; dorsal line rather long; side margins flattened above and curved below; basal margin rounded; clear white. Has no hooks.* Roswell, Georgia.
- UNIO SPATULATUS, Lea, fig. 9. Pouch-shape; dorsal line long; side margins slightly curved; basal margin rounded; clear white. Has no hooks. Fox River, Illinois.
- UNIO LUTEOLUS, Lam., fig. 10. Pouch-shape; dorsal line rather long, nearly straight; side margins flattened above and curved below; basal margin nearly semicircular; light brown. Has no hooks. Columbus, Ohio.
- UNIO RECTUS, Lam., fig. 11. Pouch-shape; dorsal line rather long; side margins arcuate;† basal margin semicircular; clear white. Has no hooks. Columbus, Ohio.
- UNIO PHASEOLUS, Hild., fig. 12. Pouch-shape; dorsal line long, slightly curved outward and obtuse at the ends; side margins more curved below than above; basal margin nearly semicircular; clear white. Has no hooks. Columbus, Ohio.
- UNIO OCCIDENS, Lea, fig. 13. Pouch-shape; dorsal line long, slightly curved outwards and obtuse at the ends; side margins slightly flattened above and rounded below; basal margin nearly semicircular; clear white. Has no hooks. Fox River, Illinois.
- UNIO NOVI-EBORACI, Lea, fig. 14. Pouch-shape; dorsal line long; side margins nearly arcuate; basal margin nearly semicircular; clear white. Has no hooks. Fox River, Illinois. In outline the three last are very nearly alike.
- UNIO OVATUS, Say, fig. 15. Pouch-shape; dorsal line short; side margins flattened above and rounded below; basal margin nearly semicircular; clear white. Has no hooks. Cincinnati, Ohio.
- UNIO WOODWARDIANUS, Lea, fig. 16. Pouch-shape; dorsal line short, slightly curved outward and obtuse at the ends; side margins subarcuate; basal margin semicircular; clear white. Has no hooks. Fig. 16^a represents a single sack about double the natural size. It is altogether different from the general form of the sacks of other species, and will be described with the singularly organized branchial uterus elsewhere. Etowah, River, Cass County, Georgia.
- UNIO MULTIRADIATUS, Lea, fig. 17. Pouch-shape; dorsal line short, slightly outwardly curved in the middle; side margins subarcuate, slightly flattened above; basal margin semicircular; clear white. Has no hooks. Columbus, Ohio.
- UNIO LIGAMENTINUS, Lam., fig. 18. Pouch-shape; dorsal line rather long, slightly outwardly curved and obtuse at the ends; side margins arcuate; basal margin semicircular; clear white. Has no hooks. Columbus, Ohio.

* Taken from the branchial uterus apparently not quite perfect.

† The figure is rather too much flattened on the sides.

UNIO TRIANGULARIS, Bar., fig. 19. Pouch-shape, approaching to oval; dorsal line rather long, obtuse at the ends; side margins arcuate; basal margin rather suddenly rounded. Clear white. Has no hooks. Part of the second valve is annexed. Columbus, Ohio.

UNIO RADIATUS, Lam., fig. 20. Pouch-shape; dorsal line long, rounded at each end and furnished with a small spur-like process on the inside of each valve at the angle;* side margins slightly curved; basal margin nearly semicircular; clear white. Has four small spur-like processes, one at each angle of the valve in the interior. Part of the second valve is annexed. Fig. 20^a represents a single sack of the natural size, being nearly half an inch long and one twentieth thick, and contained about 1200 eggs with the young well developed. Mohawk, New York.

UNIO PERPLEXUS, Lea, fig. 21. Subrotund; dorsal line very long, slightly outwardly curved in the middle, obtuse at the ends; side margins rounded; basal margin semicircular; clear white. Has no hooks. Length 0.224 mm. Breadth 0.24 mm. Columbus, Ohio.

UNIO UNDULATUS, Bar., fig. 22. Subtriangular; dorsal line very long; obtuse at the ends; side margins more curved above than below; basal margin subangular; dark brown.† Has no hooks. Columbus, Ohio.

UNIO PRESSUS, Lea, fig. 23. Subtriangular; dorsal line slightly curved, much rounded at the ends; side margins round above and compressed below to a point; basal margin angular, furnished with a hook; light brown. A hook is placed on the inside of the angle of each valve at the base. Fig. 23^a shows the form of the hook which is greatly magnified. It has an arrow-head-like point and is furnished with two rows of minute tubercles passing from the point to the base. Fox River, Illinois.

UNIO LÆVISSIMUS, Lea, fig. 24. Wedge-shape; dorsal line very short and straight; side margins above slightly incurved towards the base, much curved outward; basal margin much curved, wider than dorsal, forming acute angles, with a hook-like process on each angle; clear white. Hook-like processes very small,—four,—one on each angle of the basal margin. Both valves inflated, being opened at both sides. Fig. 24^a is a side view of the valves lying open. It was difficult to represent this perfectly. 24^b is an oblique view, showing the interior. Iowa. Length 0.16. Breadth at dorsal line 0.048. Breadth at base 0.104. Diameter of the two valves 0.096 mm.

UNIO ALATUS, Say, fig. 25. Wedge-shape; dorsal line short and straight; side margins above slightly curved outward, towards the base curved inward; at the base much curved outward; basal margin slightly curved, wider than dorsal, forming acute angles with a minute hook-like process on each angle; clear white. Hook-like processes very small—four—one on each angle of the basal margin. Both valves inflated, being opened at both sides. Fig. 25^a is an oblique view, showing the interior. Fig. 25^b is an end view, showing two small hooks at the base, and the adductor muscle above. Cincinnati, Ohio.

MARGARITANA RUGOSA, Lea, fig. 26. Sub-triangular; dorsal line very long and straight; side margins inflated above, compressed and flattened below, forming an obtuse angle at base; basal margin obtusely angular, furnished with a hook; light brown. A hook is placed on the inside of the angle of each valve at the base. Fig. 26^a is a view into the interior of the partly open valve, and exhibits the two hooks with their points nearly in contact. Fig. 26^b is the hook very much magnified, broad at the base, and terminated by an arrow-headed point. There are a number of rows of granules converging towards the point. Length 0.4. Breadth 0.368. Hook 0.112. Granules 0.0045 mm. Mohawk, New York.

* I could not observe this on all the specimens. They may exist only on the mature embryonic shell. Part of the other valve is represented as showing the processes distinctly.

† Some in the same branchial uterus were white, but probably not so much advanced.

MARGARITANA MARGINATA, Lea, fig. 27. Subtriangular; dorsal line straight, rather long; side margins much inflated above, very much compressed and flattened below, forming an obtuse angle at the base; basal margin obtusely angular, furnished with a hook. Color white. A hook is placed on the inside of the angle of each valve at the base. Part of the second valve is represented. Fig. 27^a is the hook much magnified, rather broad at the base, and terminated by an arrow-headed point. There are two rows of rather large granules, decreasing in size at the point. Part of the second valve is represented. Columbus, Ohio.

MARGARITANA TRIANGULATA, Lea, fig. 28. Subtriangular; dorsal line rather long, slightly curved upward in the middle; side margins much inflated above, compressed and flattened below, forming a very obtuse angle at the base; basal margin subangular, and rounded at the point; clear white. Could not observe any hooks. Chattahoochee River, Georgia.

MARGARITANA COMPLANATA, Lea, fig. 29. Subtriangular; dorsal line rather long, slightly curved upward in the middle; side margins very much inflated above, compressed and flattened below from the middle, forming an obtuse angle at the base; basal margin obtusely angular at the point, furnished with a hook; color brownish. A hook is placed on the inside of the angle of each valve at the base. Fig. 29^a, hook much magnified, rather broad at the base, and terminated with an arrow-headed point. There are five rows of small granules which cover the face of the hook. Cincinnati, Ohio.

MARGARITANA DELTOIDEA, Lea, fig. 30. Sub-triangular; dorsal line very long and straight; side margins much inflated above, slightly curved below, from the middle; basal margin rounded, furnished with a hook; color light brown. A hook is placed on the inside of each valve at the basal point. Fig. 30^a, the hook much magnified, rather broad at the base, and terminated with an arrow-headed point. There are five or six rows of small granules along the middle of the face of the hook. Columbus, Ohio.

MARGARITANA HILDRETHIANA, Lea, fig. 31. Subrotund; dorsal line short and slightly curved inward; side margins and base forming nearly a perfect circle; clear white. Has no hooks. This was taken from the branchial uterus, apparently not quite matured. More matured specimens may have hooks, as seems generally the case with the *Margaritanae*. Columbus, Ohio.

ANODONTA LEWISII, Lea, fig. 32. Subtriangular; dorsal line very long and straight; side margins round above, compressed and flattened below, forming a very obtuse angle at base; basal margin obtusely angular at the point, furnished with a hook; color light brown. A hook is placed on the inside of each valve at the basal point. Fig. 32^a, a hook much magnified, with an arrow-headed point. There are several rows of granules along the middle of the face of the hook, diminishing towards the point. Mohawk, New York.

ANODONTA OVATA, Lea, fig. 33. Subtriangular; dorsal line long, slightly curved at the centre; side margins curved above, compressed and flattened from above the centre, forming a very obtuse angle at base: basal margin rounded at the point, furnished with a hook; color brown; hook very similar to the last described and placed on the inside of each valve at the basal point. The figure shows part of the second valve. Columbus, Ohio.

ANODONTA DECORA, Lea, fig. 34. Subtriangular; dorsal line long, slightly curved at the centre; side margins inflated above and gently curved towards the base, forming an obtuse angle at base; basal margin slightly rounded at the point, which is minutely serrate, furnished with a hook; color brown. A rather short hook is placed on the inside of each valve at the basal point. The figure shows part of the second valve. Columbus, Ohio.

ANODONTA FERUSSACIANA, Lea, fig. 35. Subtriangular; dorsal line long and straight; side margins slightly inflated above, compressed and flattened from above the centre, forming a very obtuse angle at base; basal margin rounded; no hooks apparent; color darkish brown. Columbus, Ohio.

ANODONTA IMBECILIS, Say, fig. 36. Subtriangular; dorsal line very long and very slightly curved; side margins inflated above, gently curved towards the base; basal margin nearly circular, furnished with a hook; color light brown. A hook is placed on the inside of each valve at the base. Fig 36^a hook much magnified, triangular, broad at the base, acute at the point, with numerous regular granules over the whole surface. Columbus, Ohio.

ANODONTA EDENTULA, Lea, fig. 37. Subtriangular; dorsal line very long and straight; side margins much inflated above, slightly flattened below, forming a very obtuse angle at base; basal margin rounded and furnished with a hook; color brown. A hook is placed on the inside of each valve at the basal point. Fig. 37^a represents both valves well opened and displaying the hook on each valve. Fig. 37^b, hook very much magnified, rather broad at the base and terminated with three points. There are four rows of granules at the base, the two centre ones only extending to the end. Columbus, Ohio.

ANODONTA UNDULATA, Say, fig. 38^a. Subtriangular; dorsal line very long and straight; side margins above and middle much inflated, presenting a segment of a circle, flattened towards the base; basal margin rounded at the point, which is obscurely serrate and furnished with a hook; color bright brown. A hook is placed on the inside of each side of the valve at the base. Fig. 38 is a highly magnified view of the wide open shell with the soft parts displaying the attachment to the inside of the valve and the serrated hooks,* which were very large and exceedingly well defined. Fig. 38^b is a view looking directly into the interior, and displays the two hooks in contact at the points. Fig. 38^c represents both hooks, which are broad at base and are nearly triangular in form. They are covered entirely over with granules. The lower one is the better representation. Fig. 38^d is the branchial ovisack magnified five diameters, with the young shells, extruded from the ova, attached at the dorsal line to the exterior of the sack. The hooks were apparent in every individual. A few ova still remained within the sack which was milk-white and not diaphanous. Schuyler's Lake, New York.

OVUM OF UNIO SUBANGULATUS, Lea, fig. 39, represents a nearly round ovum greatly enlarged. It was taken from the branchial uterus, on the last day of October, and evidently was far from being very much advanced in incubation. This species probably spawns in the spring as most of the *Uniones* do. There were four nucleola composed of pale yellow granules. The albumen surrounding them was transparent. Chattahoochee River, Georgia.

*This figure and the following one are drawn on the stone more massive than they ought to have been.

ART. IV.—*New Unionidæ of the United States.*

BY ISAAC LEA, LL. D.

In my last paper, which the Academy did me the favor to publish in its late volume, I treated chiefly of new exotic *Unionidæ* from Siam. The soft parts of which unfortunately were not preserved, and therefore I had not the opportunity of making any examination of them. In the present paper, which treats of forty-one new indigenous species, I have had the advantage of examining the soft parts of very numerous specimens from various parts of the United States, many of which were living, the remainder being preserved in alcohol. Careful diagnoses have been made of the soft parts in all cases where I had the advantage of possessing them; and owing to the continued exertions of many kind friends, in various parts of the Union, whose names will be found in connection with the diagnosis of each of the species, I have been enabled to give full attention to the soft parts of nearly all the new species in this paper. I have descriptions of the soft parts prepared, of about one hundred and sixty more, including most of the indigenous species known, as well as many new ones. These will follow in the series of communications to the Academy.

It will be observed in the descriptions herein of *Unio rubellinus*, that I have referred to the fact that some species have a *byssus* at mature age. I have treated this subject more at large in the Proceedings of the Academy, Sept. 1856. In February. 1857, I made a communication also to the Academy on a discovery I had made that some of the *Unionidæ*, at least, had *visual organs*, and were sensitive to light.* This very important fact has not been further entered into by me since, except to observe several other species to be sensitive to light, viz.: *U. cylindricus*, Say, *U. rubiginosus*, (nobis,) and *Anodonta imbecilis*, Say. I hope my friend Dr. Leidy will take up this branch of the subject, and give us the anatomy of this minute eye with other portions of the economy of these interesting *Mollusca*.

UNIO ABBEVILLENSIS. Pl. 6, fig. 34.

Testâ lævi, oblongâ, subinflâtâ, ad lateris planulatis, valdè inæquelaterali, posticè biangulatâ; valvulis crassis; natibus prominulis; epidermide brunneâ, striatâ; dentibus cardinalibus magnis, crassis, in utroque valvulo duplicibus; lateralibus prælongis, lamellatis subcurvisque; margaritâ vel albâ vel salmonis colore tinctâ.

Shell smooth, oblong, rather inflated, flattened on the sides, very inequilateral, biangular behind, valves thick; beaks a little prominent; epidermis brown, striate; car-

* Prof. Haldeman, I afterwards found, (Monog. No. 6) had observed the retraction of "the protruded branchial canal of *Unio radiatus*," when light was intercepted.

dinal teeth large, thick, double in both valves; lateral teeth very long, lamellar and rather curved; nacre white or salmon color.

Proc. Acad. Nat. Sci. 1857, p. 84.

Hab.—Abbeville District, South Carolina. J. P. Barratt, M. D.

My cabinet and cabinet of Dr. Barratt.

Diam. .8,

Length 1.4,

Breadth 2.6 inches.

Shell smooth, oblong, rather inflated, flattened on the sides, very inequilateral, biangular behind, subemarginate; substance of the shell thick; beaks a little prominent and minutely wrinkled; ligament rather long and somewhat thick; epidermis brown, striate, with distant rather broad marks of growth and indistinct small green rays; umbonial slope raised, obtusely angular and somewhat inflated; posterior slope raised into a carina; cardinal teeth large, thick, pointed, oblique and double in both valves; lateral teeth very long, lamellar, rather curved, enlarged towards the end, single in the right and double in the left valve; anterior cicatrices distinct; posterior cicatrices confluent; dorsal cicatrices small and placed immediately over the centre of the cavity of the beak; palleal cicatrix distinctly impressed; cavity of the shell shallow; cavity of the beak very shallow; nacre white or salmon color.

Remarks.—Many years since, I received from Dr. Barratt a number of this species, but while it seemed to me to be distinct enough from the widely distributed *U. complanatus*, it was so closely allied, that I hesitated to separate it. Having received subsequently some good suites of different ages, I am perfectly satisfied that it is distinct. The outline is nearly the same, but the *Abbevillensis* is more biangular behind and has usually a higher umbonial slope. The marks of growth are also different, being much wider apart. In the color of the nacre also they differ, the *complanatus* being usually purple, though often white and sometimes salmon, while this species is nearly always salmon, and rarely white, but I have never seen a specimen purple. I am not, however, prepared to say that it may never occur purple, as this group of shells is very much inclined to that color. Generally there are no rays observable; but where they are, they will be found to be linear and closely placed. In the right valve the upper lobe of the cardinal tooth is very small. In the left valve they are nearly of the same size.

UNIO JAMESIANUS. Pl. 6 fig. 35.

Testâ lævi, ellipticâ, compressâ, valdè inæquilaterali, posticè valdè compressâ, ad basim emarginatâ; valvulis subcrassis; natibus prominulis, ad apices centraliter undulatis; epidermide luteâ, politâ; dentibus cardinalibus compressis, crenulatis; lateralibus longis, lamellatis valdè curvisque; margaritâ albâ et iridescente.

Shell smooth, elliptical, compressed, very inequilateral, very much compressed behind; emarginate at base, valves rather thick; beaks a little prominent, concentri-

cally undulate at the beaks; epidermis yellowish, polished; cardinal teeth compressed, crenulate; lateral teeth long, lamellar and much curved; nacre white and iridescent.

Proc. Acad. Nat. Sci., 1857, p. 84.

Hab.—Jackson, Mississippi. U. P. James.

Cabinet of Mr. James, Cincinnati.

Diam. .8,

Length 1.5,

Breadth 2.8 inches.

Shell smooth, elliptical, compressed, very inequilateral, very much compressed behind, rounded before, emarginate at base; substance of the shell rather thick, thinner behind; beaks a little prominent, rather small, with 7 or 8 small, concentric folds on the apex; ligament very long and thin; epidermis yellow, inclining to brown, smooth, polished, with rather distant marks of growth; near the margin quite yellow; posterior slope elevated into a keel, and furnished with two impressed lines on each valve from the beaks to the posterior margin; umbonial slope rounded; cardinal teeth compressed, crenulate and rather stout; lateral teeth long, lamellar, very much and regularly curved; anterior cicatrices distinct; posterior cicatrices confluent; dorsal cicatrices placed near the centre of the cavity of the beaks; cavity of the shell very shallow; cavity of the beaks shallow and sub-angular.

Remarks.—A single specimen of this species was submitted to me by Mr. U. P. James, of Cincinnati, and to him I dedicate it. It belongs to that group of which *U. campodon*, Say, may be considered the type. It may be distinguished by being more elliptical, in being higher on the posterior slope, and the lateral teeth are longer and more curved. It is closely allied to *U. manubius*, Gould, but is more elliptical, smoother, more compressed, and less angular behind, the lamellar teeth being shorter and more curved.

The lateral teeth are very remarkable for their length and their being much curved, the plate on the dorsal arch not being simply rounded. The cicatrix of the anterior adductor muscle is unusually large. Some of the lines of growth are marked by a yellow band.

UNIO SUBGIBBOSUS. Pl. 6, fig. 36.

Testâ lævi, ellipticâ, compressâ, valdè inæquilaterali, posticè subangulatâ, valvulis crassis, planulatis; natibus vix prominentibus; epidermide tenebroso-olivaceâ, striatâ, obsoletè radiatâ; dentibus cardinalibus, parvis, brevibus crassisque; lateralibus longis, crassis curvisque; margaritâ vel albâ vel salmonis colore tinctâ.

Shell smooth, elliptical, compressed, very inequilateral, subangular behind; valves thick, flattened; beaks slightly prominent; epidermis dark olive; striate, obsoletely rayed; cardinal teeth small, short and thick; lateral teeth long, thick and curved; nacre white or purple.

Proc. Acad. Nat. Sci. 1857, p. 169.

My cabinet and cabinet of Mr. White.

Shell smooth, elliptical, compressed, flattened on the sides, very inequilateral, subangular behind; substance of the shell thick; beaks slightly prominent, placed towards the anterior margin; ligament rather short and thin; epidermis dark olive, striate, obsoletely rayed, with distant marks of growth; posterior slope but slightly elevated; umbonial slope obtusely angular; cardinal teeth small, short and thick; lateral teeth long, thick, curved and enlarged at the posterior end; anterior cicatrices distinct; posterior cicatrices confluent; dorsal cicatrices placed over the centre of the cavity of the beaks; cavity of the shell very shallow; cavity of the beaks very shallow and subangular; nacre white or purple.

UNIO ELLIOTTII. Pl. 7, fig. 37.

Shell largely folded, subquadrate, inflated, very inequilateral; valves very thick; beaks somewhat prominent, swollen, undulate at the tip: epidermis black, shining; cardinal teeth very large, double in both valves; lateral teeth thick, long, lamellar and rather curved; nacre silvery white and iridescent.

Hab.—Othcalooga Creek, Gordon County, Georgia. Bishop Elliott.

Shell with numerous large folds, nearly quadrilateral, inflated, very inequilateral, rounded before; substance of the shell very thick, thicker before; beaks somewhat prominent, incurved and undulate at the tip; ligament rather short and very thick;

epidermis black and shining, coarsely, closely and transversely striate, with distant marks of growth, in the young obscurely rayed; umbonial slope rounded; posterior slope raised into a wing with about ten curved ribs enlarging rapidly towards the margin; cardinal teeth large, massive, crenulate and double in both valves; lateral teeth long, lamellar, very stout, slightly curved, single in the right and double in the left valve; anterior cicatrices very large and distinct; posterior cicatrices large and confluent; dorsal cicatrices large and placed on the plate within the cavity of the beaks; pallial cicatrix deeply impressed and distant from the margin of the disk; cavity of the shell deep and rounded; cavity of the beaks deep and subangular; nacre silvery white and iridescent.

Soft Parts.—*Branchial uterus** not charged, but ova were found in the ovarium. *Branchiæ* very large, nearly semicircular, inner ones very much the larger, free nearly the whole length of abdominal sack. *Palpi*† rather large, subelliptical, rather thin, attached obliquely to the mantle and united more than half way down the posterior edges. *Mantle* thin, with a very broad somewhat thick margin, brownish on the posterior edges, expanded in the postero-dorsal margin. *Branchial opening* small, with very light brown, obtusely conical papillæ on the inner edges. *Anal opening* with numerous very minute papillæ on the inner edges. *Super-anal opening* very long, edges dark brown, united slightly at the lower part. The whole mass nearly white. The six specimens sent in alcohol‡ by Bishop Elliott, were all without ova in the branchial uterus. The form of these therefore is not yet ascertained.

Remarks.—There is perhaps no species of the great group of folded *Uniones* more remarkable or attractive than this, which I have great pleasure in dedicating to my friend the Right Reverend Stephen Elliott, of Georgia, who has done so much, and with the true spirit of science, to develop this branch of the natural history of his State, within the bounds of which exist a larger number and more various species than have been found in any other of the United States. It will be observed in these memoirs that he has brought to light not only a vast number of new species, but that he has carefully collected them, *with their soft parts*, so that I am enabled to give the chief points of their anatomical structure.

This species is nearly related to *U. atrocostatus*, (nobis,) but it is larger, more quadrate and has larger folds. In the young there is a marked distinction in the *Elliottii*, having a very remarkable golden yellow nacre posteriorly, which differs from any other species I have seen. This peculiar tint I have observed only in the young and half grown specimens of this species. There is a golden tint in the full grown *U. dromas* (nobis,) and some of its allied species, but the tint of *Elliottii* is more inclining

* See note on page 43, on *branchial uterus*.

† Called by Brard lips or tentacles.

‡ The specimens described in this paper, (so far as relates to the soft parts in alcohol,) may be found to vary somewhat from living specimens.

to gamboge yellow. My smallest specimen is about an inch wide, and I doubt if the yellow nacre exist in those much younger. The outline is quadrate, varying towards rotund, the younger being very nearly round. The epidermis in old fine specimens is almost jet black; in the younger it is very dark green and obscurely rayed. Usually in the full grown there are eight oblique folds between the beaks and the basal margin, the four or five last being large and occupying nearly the whole space. There are usually four small nearly concentric undulations at the tip. The interior border in good specimens has a well marked black line more developed on the posterior portion.

UNIO GRACILLIOR. Pl. 8, fig. 38.

Testâ lævi, ellipticâ, inflatâ, inæquilaterali, valvulis tenuibus; natibus prominulis; epidermide tenebroso-fuscâ, obsoletè radiatâ et nitidâ; dentibus cardinalibus compressis erectisque; lateralibus lamellatis, longis subcurvisque; margaritâ albidâ et valdé iridescente.

Shell smooth, elliptical, inflated, inequilateral; valves thin; beaks a little prominent; epidermis dark brown, obscurely radiated and bright; cardinal teeth compressed and erect; lateral teeth lamellar, long and somewhat curved; nacre whitish and very iridescent.

Proc. Acad. Nat. Sci., 1856, p. 262.

Hab.—Buckhead Creek, Georgia, and Tobesaufke Creek, near Macon, Georgia. Bishop Elliott.

My cabinet and cabinet of Bishop Elliott.

Diam. .6,

Length 1.1,

Breadth 2 inches.

Shell smooth, elliptical, inflated, inequilateral, rounded behind and before; substance of the shell thin, slightly thicker before; beaks slightly prominent; lines of growth few and rather distant; ligament somewhat long and slender; epidermis dark brown, shining, transversely wrinkled, obsoletely radiate; umbonial slope rounded; cardinal teeth rather small, oblique, compressed, erect and slightly crenulate, single in the right and double in the left valve; lateral teeth long, lamellar, slightly curved, single in the right and double in the left valve; anterior cicatrices distinct; posterior cicatrices confluent; dorsal cicatrices small and placed nearly in the centre of the cavity of the beaks; cavity of the shell rather deep; cavity of the beaks rather shallow and subangular; nacre bluish-white and very iridescent.

Soft Parts.—*Branchial uterus* situated on the posterior half only, of the outer branchiæ, and in the specimen before me presenting sixteen branchial ovisacks* in each of the outer branchiæ. These extend a short distance beyond the edge of the branchiæ. *Branchiæ* rather large, inner ones much the larger and nearly round below, free only at the point of abdominal sack. *Palpi* rather large and subtrian-

*This term is applied to the individual sack, situated within or attached to the branchiæ, the whole number in the aggregate being considered as the *branchial uterus*.

gular, rather thin, united but a short distance down the posterior edges. *Mantle* thin, thickened along the edge, deeply colored, nearly black along the posterior margin, which has numerous dark brown papillæ on the edge for some distance below the branchial opening. *Branchial opening* large, with numerous small brown papillæ on the inner edges. *Anal opening* rather large with numerous very minute light brown papillæ on the inner edges. *Super-anal opening* rather large, edge slightly colored, united below. Color of the mass whitish.

Remarks.—Seven or eight specimens were received from Bishop Elliott, in alcohol. This species is nearly allied to *U. exiguus*, (nobis,) but is more regularly oval, more inflated, browner, and has larger cardinal and lateral teeth. The *exiguus* is not brown like this, but green, and much rayed. They are both delicate species. The epidermis about the middle of the outside of the valve is usually bright and polished. It is of an unusually regular ellipse.

UNIO FULLATUS. Pl. 8, fig. 39.

Testâ lævi, obliquo-transversâ, paulisper inflatâ, valdè inæquilaterali; valvulis crassis; natibus prominulis, ad apices undulatis; epidermide vel tenebroso-fuscâ vel nigrâ; dentibus cardinalibus curtis, crassis, in utroque valvulo duplicibus; lateralibus crassis, longis subrectisque; margaritâ vel purpureâ vel salmonis colore tinctâ et iridescente.

Shell smooth, obliquely transverse, somewhat inflated, very inequilateral; valves thick; beaks a little prominent, undulate at the tip; epidermis dark brown or black; cardinal teeth short, thick, double in both valves; lateral teeth thick, long and erect; nacre purple or salmon color and iridescent.

Proc. Acad. Nat. Sci. 1856, p. 262.

Hab.—Creeks near Columbus, Georgia. Bishop Elliott.

My cabinet and cabinets of Bishop Elliott and Dr. Lewis.

Diam. 1·1,

Length 1·7,

Breadth 3·4 inches.

Shell smooth, obliquely transverse, somewhat, inflated, very inequilateral, rounded before, subangular behind; substance of the shell thick, thicker before; beaks a little prominent, rugosely undulate at the tip; lines of growth distant; ligament rather long and somewhat stout; epidermis very dark brown or black, usually bright on the sides, in the young obscurely radiate; umbonial slope obtusely angular; cardinal teeth short, thick, striate, disposed to be double in both valves; lateral teeth thick, long, erect, nearly straight, single in the right and double in the left valve; anterior cicatrices distinct and deeply impressed; posterior cicatrices confluent; dorsal cicatrices placed in the cavity of the beaks posterior to the cardinal tooth; cavity of the shell rather shallow; cavity of the beaks shallow and angular; nacre usually salmon in the cavity and purple on the border and iridescent.

Soft Parts.—*Branchial uterus* spread out on the whole length of the outer branchiæ. *Branchiæ* not very large, very transverse, inner ones somewhat the larger, gently curved below, free two-thirds the length of abdominal sack. *Palpi* very small, oblique,

thin, subangular, free nearly the whole length of the posterior edge. *Mantle* thin, thickened at the margin, not colored except at syphonal openings. *Branchial opening* rather large, with numerous rather small brown papillæ on the inner edges. *Anal opening* long, with numerous small brown papillæ on the inner edges. *Super-anal opening* long, slightly colored inside and united below for some distance. Color of the mass whitish.

Remarks.—This is a very common shell near Columbus. It belongs properly to the group of which *complanatus* may be considered as the type; but it is wider and more oblique, and the epidermis is darker and smoother. In the nacre it is very much the same. Generally the interior, from the pallear cicatrix, is tinted with salmon, while outside of the line of this cicatrix it is purple. I have seen none which were entirely white, but a few were entirely purple. The undulations of the beaks are small, rather rugose, making an inflection in the middle. The very young are usually greenish, with distinct rays over the whole disk. In the next growth they are dark brown, afterwards the epidermis becomes black or nearly so, and the rays entirely disappear. When full grown the cardinal teeth usually are curved towards the posterior margin. The epidermis on the side is usually smooth and shining. In outline it approaches *Unio Barrattii*, (nobis,) but is more inequilateral and darker.

UNIO FAVOSUS. Pl. 8, fig. 40.

Testâ lævi, subtriangulari, subcompressâ, inequilaterali, posticè subangulatâ; valvulis suberassis; natibus prominulis, ad apices undulatis; epidermide luteo-olivaceâ, virido-maculatâ; dentibus cardinalibus magnis erectisque; lateralibus crassis, sublongis subrectisque; margaritâ argenteâ et valdè iridescente.

Shell smooth, subtriangular, rather compressed, inequilateral, angular behind; valves thick; beaks prominent, undulate at the tip; epidermis olive yellow and green spotted; cardinal teeth large and erect; lateral teeth thick, rather long and erect; nacre silvery and very iridescent.

Proc. Acad. Nat. Sci., 1856, p. 262.

Hab.—Othcalooga Creek, Gordon County, Georgia. Bishop Elliott.

My cabinet and cabinet of Bishop Elliott.

Diam. .8, 1.3, Breadth 2 inches.

Shell smooth, subtriangular, rather compressed, inequilateral, angular behind and rounded before; substance of the shell thick, much thicker before; beaks prominent, with two or three rather rough undulations at the tip; lines of growth very distant, usually five; ligament short and rather thick; epidermis dark olive yellow, with a row of green broad spots before the umbonial slope, smooth at the umbo, but much striate towards the margin; umbonial slope slightly rounded; cardinal teeth large, erect, pyramidal, crenulate, single in the right and double in the left valve; lateral teeth thick, rather long, erect and nearly straight; anterior cicatrices usually confluent, and rather deep; posterior cicatrices confluent; dorsal cicatrices placed on the plate

within the cavity of the beaks; cavity of the shell very shallow; cavity of the beaks shallow and subangular; nacre pure white, and very iridescent.

Soft Parts.—*Branchial uterus* occupies the whole leaf of the outer branchiæ. *Branchiæ* rather large, nearly semi-circular, inner ones much the larger, free nearly the whole length of the abdominal sack. *Palpi* small, oblique, subtriangular, rather thin, united but a short distance on the posterior edge. *Mantle* very thin, thickened, and slightly colored at the margin. *Branchial opening* rather large, with numerous very small light brown papillæ on the inner edges. *Anal opening* very small, with minute light brown papillæ. *Super-anal opening* very long, slightly colored within the edges, and very slightly united below. Color of the mass whitish.

Remarks.—Among the numerous new *Uniones* sent by Bishop Elliott, were many fine specimens of this beautiful species, which is rarely more than two inches wide. In outline it approaches the *U. rubiginosis*, (nobis,) and *U. Bigbyensis*, (nobis,) and more particularly the latter; but it is not quite so much compressed, nor are the rays alike, the *favosus* having broad green spots, usually in a single row, on the space between the marks of growth, and immediately before the umbonial slope, while the *Bigbyensis* is rayed all over with usually thin lines, and in the epidermis it is more yellow. In the undulations of the beaks they also differ, the latter having numerous rather small ones, while *favosus* has but two or three, and these are rather rough, and almost tuberculose. The largest green spot is usually on the third growth near the middle.

UNIO RUTILANS. Pl. 9, fig. 41.

Testâ lævi, ellipticâ, inflatâ, valdè inæquilaterali, in medio ad basim paulisper compressâ; valvulis tenuibus; natibus prominulis; epidermide luteo-viridi, politâ et valdè radiatâ; dentibus cardinalibus parvis, compressis, in utroque valvulo duplicibus; lateralibus prælongis, lamellatis subcurvisque; margaritâ cæruleo-albâ et valdè iridescente.

Shell smooth, elliptical, inflated, very inequilateral, somewhat compressed in the middle towards the base; valves thin; beaks a little prominent; epidermis yellowish green, polished and very much radiated; cardinal teeth small, compressed, double in both valves; lateral teeth very long, lamellar and somewhat curved; nacre bluish white and very iridescent.

Proc. Acad. Nat. Sci. 1856, p. 262.

Hab.—Othcalooga Creek, Gordon County, and Columbus, Georgia. Bishop Elliott. My cabinet and cabinet of Bishop Elliott.

Diam. .1, Length 1.4, Breadth 2.7 inches.

Shell smooth, elliptical, inflated, very inequilateral, somewhat compressed in the middle towards the base, rounded before and behind; substance of the shell very thin, thicker before; beaks a little prominent, and with a few small irregular undulations at the tip; ligament rather short and thin; epidermis yellowish green, polished, with numerous rays, the broader ones on the posterior portion; cardinal teeth small, compressed, pointed, double in both valves; lateral teeth very long, thin, lamellar and

towards the margin; cardinal teeth small, compressed, striate, double in both valves; lateral teeth very long, lamellar and nearly straight, single in the right and double in the left valve; anterior cicatrices distinct and rather deeply impressed; posterior cicatrices large and confluent; dorsal cicatrices small and placed above the centre of the cavity of the beaks; cavity of the shell shallow; cavity of the beaks very shallow and rounded; nacre purple or salmon and iridescent.

Soft Parts.—*Branchial uterus* not changed in any of the six under examination; some had ova in the ovarium. *Branchiae* very wide, gently curved below, the inner ones very much the larger, free two thirds the length of abdominal sack. *Palpi* rather large, subangular, united half way down the posterior edges. *Mantle* very thin, slightly thickened at the margin. *Branchial opening* rather large, with small light brown *papillae* on the inside of the edges. *Anal opening* rather large, with very indistinct crenulations on the edges. *Super-anal opening* large, edges not colored, united below for some distance. Color of the mass whitish.

Remarks.—This belongs to the *complanatus* group, and is between *Tuomeyi* (nobis) and *complanatus*. It is more oval than the latter and not so oblique as the former. In outline it is near also to *U. vicinus* (nobis). Nearly all the specimens which have come under my notice have a small ventral cicatrix. I have not seen any young individuals, nor adults, with perfect beaks, but presume that the undulations of the tips will be found very much like those of *complanatus*.

UNIO VICINUS. Pl. 9, fig. 43.

Testâ lævi, oblongâ, compressâ, inæquilaterali; valvulis subcrassis; natibus prominulis; epidermide viridofuscâ, obsoletè radiatâ; dentibus cardinalibus parvis, acuminatis compressisque; lateralibus longis subcurvisque; margaritâ argenteâ et valdè iridescente.

Shell smooth, oblong, compressed, inequilateral; valves rather thick; beaks a little prominent; epidermis greenish brown, obscurely radiated; cardinal teeth small, pointed and compressed; lateral teeth long and somewhat curved; nacre silvery and very iridescent.

Proc. Acad. Nat. Sci. 1856, p. 262.

Hab.—Swift Creek, near Macon, Georgia. Bishop Elliott.

My cabinet and cabinet of Bishop Elliott.

Diam. .7, Length 1.4, Breadth 2.6 inches.

Shell smooth, oblong, compressed towards the middle and the basal margin, subangular behind and raised on the posterior slope quite into a keel; substance of the shell rather thick; beaks a little prominent; ligament rather long and thin; epidermis greenish brown, with obsolete rays, shining on the umbones, with very distant marks of growth; cardinal teeth small, pointed, compressed, striate, single in the right and double in the left valve; lateral teeth very long, lamellar and slightly curved; anterior cicatrices distinct; posterior cicatrices rather large and confluent; dorsal cicatrices

shell not very deep; cavity of the beaks rather shallow and subangular; nacre silver white and iridescent.

Soft Parts.—*Branchial uterus* ——. *Branchiæ* very large, inner ones much the larger; much curved below, attached the whole length of the abdominal sack.* *Palpi* very large, angular below, not attached on the posterior edge. *Mantle* thin, thicker on the margin and colored on the edges. *Branchial opening* rather large, with black papillæ on the inner edges. *Anal opening* rather small, with small nearly black crenulations on the inner edges. *Super-anal opening* very long, dark on the inner edge and united below for a short distance. Color of the mass whitish.

Remarks.—Several specimens were received from Bishop Elliott in alcohol, but no female individual. It is nearly allied to *rutilans*, (nobis,) but is a much thicker shell, with a whiter nacre, and larger and more tubercular cardinal teeth, that in the left valve having the anterior lobe much the larger. The lateral teeth are also much thicker. The outline is nearly of a regular ellipse, but enlarged at the basal margin. The specimen figured is probably a female, the part before the umbonal slope being enlarged.

UNIO GEMINUS. Pl. 10, fig. 45.

Testâ lævi, ellipticâ, inflatâ, valdè inæquilaterali; valvulis crassis; natibus prominulis; epidermide tenebroso-castaneâ, obsoletè radiatâ, ad umbones politâ; dentibus cardinalibus magnis, acuminatis, in utroque valvulo duplicibus; lateralibus longis, crassis subcurvisque; margaritâ purpureâ et iridescente.

Shell smooth, elliptical, inflated very inequilateral; valves thick; beaks a little prominent; epidermis dark chestnut; obscurely radiated, polished at the umbones; cardinal teeth large, pointed, double in both valves; lateral teeth long, thick and somewhat curved; nacre purple and iridescent.

Proc. Acad. Nat. Sci., p. 262.

Hab.—Buckhead Creek, Burke Co., Georgia. Bishop Elliott.

My cabinet and cabinet of Bishop Elliott.

Diam. 1·2, Length 1·7, Breadth 2·9 inches.

Shell smooth, elliptical, inflated, very inequilateral, rounded before, subbiangular behind; substance of the shell thick, rather thinner behind; beaks a little prominent; ligament rather short and somewhat stout; epidermis dark chestnut brown, polished on the side and rather roughly striate towards the margin, very obscurely rayed, with not very distant lines of growth; cardinal teeth large, pointed, crenulate, double in both valves; lateral teeth long, thick, lamellar and somewhat curved; anterior cicatrices distinct and deeply impressed; posterior cicatrices confluent; dorsal cicatrices rather small, and placed in the centre of the cavity of the beaks; cavity of

*On each side along the attachment of the inner branchiæ with the abdominal sack, there were two small blind pouches, which at first I thought led to the upper cavity, but they were not opened through, and I presume were the nidus of some parasite.

Soft Parts.—*Branchial uterus* filling the whole length of outer branchiæ. *Branchiæ* very wide, gently curved below, the inner one somewhat the larger, free two-thirds the length of abdominal sack. *Pulpi* small, subtriangular, united at the upper part of the posterior edges. *Mantle* thin, thicker at the margin, without color at the edge, emarginate at posterior end. *Branchial opening* very small, with small brown papillæ. *Anal opening* small, with very minute papillæ. *Super-anal opening* long, slightly colored inside, attached for some distance below. Color of the mass whitish, inclining to a salmon colored tint.

Remarks.—Several specimens of this interesting species were sent to me by Bishop Elliott. It is allied to *sagittæformis* (nobis) and to *Fisherianus* (nobis). It is more slender and more transverse than the former, and is not so oblique as the latter, and is not so angular on the umbonial slope, nor so acute at the posterior margin. It has a graceful form, and is easily distinguished from these or any other species.

UNIO BLANDIANUS. Pl. 11, fig. 47.

Testâ tuberculatâ, quadratâ, inflatâ, subinæquilaterali, posticè truncatâ et emarginatâ, ad basim emarginatâ, in medio sulcatâ; valvulis percrassis anticè crassioribus; natibus prominentibus, compressis, incurvis, ad apices rugoso-undulatis; epidermide tenebroso-castaneâ; dentibus cardinalibus crassissimis, crenulatis, in utroque valvulo duplicibus; lateralibus brevibus, percrassis rectisque; margaritâ argenteâ et iridescente.

Shell tuberculate, quadrate, inflated, a little inequilateral, truncate and emarginate behind, and at the base emarginate, furrowed in the middle; valves very thick, thickest before; beaks very prominent, compressed, curved inwards, at the tips rugosely undulate; epidermis dark chestnut color; cardinal teeth enormously thick, crenulate and double in both valves; lateral teeth very short, very thick and straight; nacre silver white and iridescent.

Proc. Acad. Nat. Sci. 1856, p. 263.

Hab.—Othcalooga Creek, Gordon County, Georgia. Bishop Elliott.

My cabinet and cabinets of Bishop Elliott and Mr. Bland.

Diam. 2, Length 3.2, Breadth 3.4 inches.

Shell tuberculate, quadrate, inflated, very nearly equilateral, truncate and emarginate behind and sharply emarginate at base, with a rather deep furrow from beak to near the middle of basal margin, rounded before; substance of the shell exceedingly thick and ponderous, much thicker before; beaks very prominent, compressed, curved inwards, at the tip rugosely undulate or granulate; ligament rather short and very thick; epidermis dark chestnut, shining, with distant marks of growth; tubercles over nearly the whole of the anterior half of the disk and on the posterior slope, where they are arranged in curved rows; the umbonial slope is raised into a ridge, rounded, free from tubercles and has a wide furrow before and a small one behind; cardinal teeth enormously thick, crenulate, elevated and double in both valves; lateral teeth,

very thick, very short, blunt at the ends, roughly striate and double in both valves; anterior cicatrices very distinct and very deeply impressed; posterior cicatrices confluent; dorsal cicatrices numerous along the lower side of the cardinal tooth in a row leading into the cavity of the beak; cavity of the shell rather deep; cavity of the beaks deep and subangular, nacre silver white, very pure and iridescent.

Soft Parts.—*Branchial uterus* was not charged, but the ovarium of each of three females examined, was filled with ova. *Branchiæ* rather small, semicircular, inner ones much the larger, the whole four leaves remarkably thick and were without any ova, free nearly the whole length of the abdominal sack. *Palpi* large, oblique, suboval, united more than half way down the posterior edges. *Mantle* rather thin, very much enlarged anteriorly, and superiorly thickened at the edges, with a wide pallear border. *Branchial opening* large, with numerous brownish papillæ in groups and diverging. *Anal opening* rather small and without any *Papillæ* or *crenulations* on the edges. *Super-anal opening* very long and deep, slightly colored on the inner edges and united below for a short distance. Color of the mass whitish.

Remarks.—I owe to the kindness of Bishop Elliott a fine suite of nearly all ages of this beautiful species, among the finest of all the tuberculate group. It is nearly allied to *Rumphianus* (nobis) and *metanever* Raf., and is the largest of the species which belong to the group which embraces those species. It differs from them in having a smooth umbonial slope, quite raised and rounded, while *metanever* has a number of regular large tubercles and *Rumphianus* a larger number of small irregular tubercles on this slope. Some individuals have tubercles over the whole disk except on the umbonial slope, while others have only a few on the upper portions of it. Towards the beaks and on them the tubercles are smaller, thickly set and disposed to arrange themselves in rows forming an acute angle. The tubercles are usually pointed below and lie like tears on the side as they do in *lacrymosus* (nobis). The teeth are enormously large and massive and very much corrugated. The lateral tooth very short and thick is in a direct line from the tip of the beak to the posterior margin. All the cicatrices are deeply impressed including the pallear. I have great pleasure in naming this beautiful species after my friend, Mr. Thomas Bland, who has done so much for American conchology.

UNIO CONCESTATOR. Pl. 12, fig. 48.

Testâ lævi, ellipticâ, inflatâ, inæquilaterali, anticè rotundatâ; valvulis subcrassis, anticè crassioribus; natibus prominulis; epidermide nigricente, eradiatâ, transversè striatâ; dentibus cardinalibus subcrassis, in utroque valvulo duplicibus crenulatisque; lateralibus longis subcurvisque; margaritâ vel purpureâ vel salmonis colore tinctâ et iridescente.

Shell smooth, elliptical, inflated, inequilateral, rounded before; valves rather thick, thicker before; beaks somewhat prominent; epidermis nearly black, without rays,

transversely striate; cardinal teeth rather thick, double in both valves and crenulate; lateral teeth long and somewhat curved; nacre purple or salmon color and iridescent.

Proc. Acad. Nat. Sci. 1857, p. 31.

Hab.—Creeks near Columbus, Georgia. Bishop Elliott and Dr. Lewis.

My cabinet and cabinets of Bishop Elliott and Dr. Lewis.

Diam. 1, Length 1.4, Breadth 2.3 inches.

Shell smooth, elliptical, inflated, inequilateral, regularly rounded before and very obtusely angular behind; substance of the shell rather thick, thicker before; beaks somewhat prominent; ligament rather long and slender; epidermis very dark, nearly black, with rather close marks of growth, smooth and shining on the umbones and transversely striate on the margin; umbonial slope round; cardinal teeth rather small and thick, crenulate, double in both valves; lateral teeth long, lamellar and somewhat curved; anterior cicatrices distinct and rather deeply impressed; posterior cicatrices rather small and confluent; dorsal cicatrices placed in the centre of the cavity of the beaks, cavity of the shell rather deep; cavity of the beaks rather deep and angular; nacre beautifully salmon or purple and very iridescent.

Soft Parts.—*Branchial uterus* situated in posterior part of the outer branchiæ in large ovisacks like *cariosus*, Say. *Branchiæ* rather small, inner ones very much the larger, nearly semicircular, united the whole length of the abdominal sack. *Pulpi* large, thin, suboval, united at the posterior edges only at the upper part. *Mantle* thin, thicker at the margin, with colored rather sharp papillæ below the branchial opening for some distance. *Branchial opening* small, with numerous small brown papillæ on the inner edges. *Anal opening* very small, with very small brown spotted papillæ. *Super-anal opening* rather small, colored on the edges, united below. Color of the mass whitish.

Embryonic shell elongate pouch-shape; color clear white.

Remarks.—Many specimens of this very beautiful species were sent to me by Bishop Elliott and other friends, but none were with perfect beaks, so that I know not if they be undulate. It is near to *subellipsis* (nobis,) but is a smaller species, and I have never seen any one with a white nacre, while *subellipsis* is I believe always white. In the epidermis it is darker, has no rays and is disposed to be transversely furrowed. The specimen figured is a male. The female is very obtuse at the posterior end and much inflated on the umbonial slope. The nacre is remarkably fine. In very perfect specimens it is beautifully, and usually intensely, colored, and satin like.

UNIO EXTENSUS. Pl. 12, fig. 49.

Testâ lævi, valdè transversâ, valdè compressâ, ad latere planulatâ, valdè inæquilaterali, posticè subangulatâ; valvulis suberassis; natibus prominulis; compressis; epidermide tenebroso-fuscâ, transversè striatâ; dentibus cardinalibus suberassis, acuminatis; lateralibus prælongis, rectis, posticè incrassatis; margaritâ albâ et iridescente.

Shell smooth, very transverse, very much compressed, flattened at the sides, very inequilateral, angular behind; valves rather thick; beaks slightly prominent and compressed; epidermis dark brown, transversely striate; cardinal teeth rather thick and pointed; lateral teeth very long and straight, thickened at the end; nacre white and iridescent.

Proc. Acad. Nat. Sci., 1857, p. 31.

Hab.—Dry Creek near Columbus, Georgia. Bishop Elliott.

My cabinet and cabinet of Bishop Elliott.

Diam. .9, Length 1.6, Breadth 3.6 inches.

Shell smooth, very transverse, elliptic-lanceolate, very much compressed, flattened at the side, very inequilateral, angular behind and obliquely rounded before; substance of the shell rather thick and somewhat thicker before; beaks slightly prominent, compressed and furnished with a few irregular undulations at the tip; ligament long and thin; epidermis dark brown, transversely and deeply striate, sulcose at the anterior margin, with distant lines of growth and apparently without rays; umbonial slope obtusely angular; cardinal teeth rather thick, pointed, crenulate and disposed to be double in both valves; lateral teeth very long, straight and much thickened towards the posterior end; anterior cicatrices distinct and rather deeply impressed, the superior one very large; posterior cicatrices confluent, the inferior one very large; dorsal cicatrices rather small and placed under the plate posterior to the cardinal tooth; cavity of the shell shallow and wide; cavity of the beaks very shallow and rounded; nacre white and iridescent.

Soft Parts.—*Branchial uterus* extended probably the whole width of outer branchiæ. In the only specimen received, the ova transferred were not mature and many were yet in the ovarium, so that the leaf of the outer branchiæ on each side was only filled two thirds the length and that in the middle portion. The branchial ovisacks do not extend to the lower edge, but leave a border there. *Branchiæ* very wide, short, rather thin, the inner ones much the larger, extending below the whole width, free nearly the whole length of abdominal sack. *Palpi* very large, oblique, angular at the end, united a short distance on the upper posterior edges. *Mantle* thin, with a broad margin slightly colored at the edge. *Branchial opening* small, with numerous small brown papillæ on the inner edges. *Anal opening* very small, with numerous very minute papillæ on the edges. *Super-anal opening* very long, united below for a short distance and in the middle for a long distance. Color of the mass whitish, inclined to salmon.

Remarks.—There were three specimens received from Bishop Elliott in alcohol, all being females. It is very near to *saggitæformis*, (nobis,) and belongs to the group of which *angustatus* (nobis) may be considered the type. It is more ovate and striate than the former, and is darker in the epidermis, more deeply striate and not so high on the umbonial slope as the latter. It is also disposed to be more white in the nacre than either of them, and appears to be destitute of rays. In the left valve the

double lateral tooth is remarkable for having the lower division very much enlarged towards the posterior end, while the upper division in the specimen before me is very small, quite acicular and pointed, indeed almost obsolete.

UNIO PYRIFORMIS. Pl. 12, fig. 50.

Testâ lævi, obliquâ, oviformis, valdè compressâ, valdè inæquilaterali, posticè biangulatâ; valvulis subcrassis, anticè crassioribus; natibus subprominentibus; epidermide luteo-castaneâ, nitidâ, eradiatâ; dentibus cardinalibus subgrandibus crenulatisque; lateralibus subbrevis subcurvisque; margaritâ vel salmonis colore tinctâ vel albâ et iridescente.

Shell smooth, oblique, oviform, very much compressed, very inequilateral, biangular behind; valves rather thick, thicker before; beaks a little prominent; epidermis yellowish chestnut color, polished, rayless; cardinal teeth rather large and crenulate; lateral teeth rather short and somewhat curved; nacre usually salmon color, sometimes whitish and iridescent.

Proc. Acad. Nat. Sci., 1857, p. 31.

Hab.—Near Columbus, Georgia. Bishop Elliott.

My cabinet and cabinet of Bishop Elliott.

Diam. .6,

Length 1.3,

Breadth 2.1 inches.

Shell smooth, oblique, oviform, very much compressed, very inequilateral, biangular behind and rounded before; substance of the shell rather thick, thicker before; beaks a little prominent, situated towards the anterior margin; ligament short and somewhat thick; epidermis yellowish chestnut color, polished, rayless, with distant lines of growth; umbonial slope flattened; cardinal teeth rather large, crenulate, disposed to be double in both valves; lateral teeth rather short, somewhat curved, with rather a broad plate between the lateral and cardinal teeth; anterior cicatrices distinct and deeply impressed; posterior cicatrices distinct and well impressed; dorsal cicatrices well impressed and nearly in the centre of the cavity of the beaks; cavity of the shell very shallow; cavity of the beaks very shallow and rounded; nacre usually pale salmon color, sometimes whitish, iridescent.

Soft Parts.—*Branchial uterus.*—There was no appearance of ova in the branchial ovisacks, but the ovarium was filled with immature ones. *Branchiæ* large, semi-circular, inner ones somewhat the larger, free nearly the whole length of abdominal sack. *Palpi* large, oval, attached at the upper portion of the posterior edges. *Mantle* thin, thickened at the margin. *Branchial opening* small, with numerous small brownish papillæ. *Anal opening* small, with very small brownish papillæ. *Super-anal opening* rather small, united below for a short distance. Color of the mass whitish.

Remarks.—A number of specimens are before me from Bishop Elliott. This species is remarkable for its ovate outline, being somewhat pear-shape. It is nearest to *argenteus*, (nobis,) but is rather more oblique, has a more yellowish epidermis and is never, I believe, silver white in the nacre like that species. I have seen no specimens with

rays, but the young may have them partially. The posterior slope is usually lighter in color.

UNIO RUBELLINUS. Pl. 13, fig. 51.

Testâ plicatâ, transversâ, subtriangulâri, subinflatâ, valdè inæquilaterali, posticè acutè angulatâ, anticè rotundatâ; valvulis suberassis, anticè crassioribus; natibus prominulis, ad apices undulatis; epidermide rubiusculâ, nitidâ, radiatâ et maculatâ; dentibus cardinalibus parvis, erectis acuminatisque; lateralibus longis, lamellatis subrectisque; margaritâ rubidâ et iridescente.

Shell folded, transverse, subtriangular, rather inflated, very inequilateral, acutely angular behind and rounded before; valves rather thick, thicker before; beaks somewhat prominent, undulate at the tip; epidermis a little reddish, bright, radiated and spotted; cardinal teeth small, erect and sharp; lateral teeth long, lamellar and nearly straight; nacre reddish and iridescent.

Proc. Acad. Nat. Sci. 1857, p. 32.

Hab.—Othcalooga Creek, Gordon County, Georgia. Bishop Elliott.

My cabinet and cabinet of Bishop Elliott.

Diam. .6,

Length .7,

Breadth 1.6 inches.

Shell folded, transverse, subtriangular, rather inflated, very inequilateral, acutely angular behind, and constricted at the posterior basal margin, obliquely rounded before, with small folds on the posterior slope and towards the posterior basal margin; substance of the shell rather thick, much thicker before; beaks somewhat prominent, with a few irregular undulations at the tip; ligament very short and thin; epidermis a little reddish, bright, obsoletely radiate and marked with minute arrow-head like spots; umbonial slope angular; cardinal teeth small, erect, very sharply pointed, single in the right and double in the left valve; lateral teeth long, lamellar, nearly straight, and enlarged at the posterior end; anterior cicatrices distinct and deeply impressed; posterior cicatrices distinct; dorsal cicatrices placed across the centre of the cavity of the beaks; cavity of the shell rather deep; cavity of the beaks rather shallow and subangular; nacre reddish, disposed to salmon color and iridescent.

Soft Parts.—*Branchial uterus* occupying nearly the whole length of the outer branchiæ in rather large ovisacks, having on the lower margin a rather wide reddish brown border. *Branchiæ* small, rather thick, nearly straight below, the inner ones slightly the larger, free nearly half the length of abdominal sack. *Pulpi* very small, subelliptical, united only at the upper part of the posterior edges. *Mantle* thin, thickened at the margin, having the edges dark brown. *Branchial opening* small, with small dark brown papillæ on the inner edges. *Anal opening* rather large, with brownish crenulations on the inner edges. *Super-anal opening* rather long, edge slightly colored within, united below for a short distance. Color of the mass whitish.

Byssus.—In all the specimens which have come under my notice (four adults) there remains on the inferior mesial portion of the foot, a linear cicatrix, extending

to the posterior portion, which is evidently made by a byssus. In the two closely allied species *acutissimus* and *Conradicus* (nobis,) I have elsewhere described the byssus,* which remained perfect in adult species. There cannot, therefore, be any question as to the fact that *rubellinus* is furnished with a byssus, even at its full maturity, by which it anchors itself.

Embryonic shell subovate pouch-shape; color clear white.

Remarks.—This is a very beautiful little species nearly allied to *acutissimus* and *Conradicus*. Several fine specimens were received from Bishop Elliott. The rays are indistinct, and are formed partly by obscure arrowhead or zigzag markings, which are plainer on the posterior half. The nacre is usually a fine red, but sometimes inclined to salmon color. The males (see the figure) are much constricted behind and emarginate at base. The posterior third is usually furnished with small folds which are sometimes crimped.

UNIO EXCAVATUS. Pl. 13, fig. 52.

Testâ lævi, subtriangulari, valdè inflatâ, subæquilaterali, posticè angulatâ; valvulis subcrassis, anticè crassioribus; natibus valdè prominentibus et tumidis; epidermide vel luteâ vel luteo-olivâ, politâ, radiatâ, anticè subsulcatâ; dentibus cardinalibus magnis, erectis, conico-compressis, crenulatis, in utroque valvulo duplicibus; lateralibus subbrevis, lamellatis crassisque; margaritâ albâ et iridescente.

Shell smooth, subtriangular, very much inflated, nearly equilateral, angular behind; valves rather thick, thicker before, beaks very prominent and much inflated; epidermis yellowish or yellow-olive, polished, rayed, subsulcate before; cardinal teeth large, erect, compressed-conical, crenulate, double in both valves; lateral teeth rather short, lamellar and thick, nacre white and iridescent.

Proc. Acad. Nat. Sci., 1857, p. 32.

Hab.—Othcalooga Creek, Gordon County, Georgia, Bishop Elliott, and Etowah, Georgia, Rev. Geo. White; Alabama River, Claiborne, Alabama, Judge Tait.

My cabinet and cabinets of Bishop Elliott and Rev. Mr. White.

Diam. 2.2, Length 3, Breadth 4.1 inches.

Shell smooth, subtriangular, very much inflated, nearly equilateral, angular behind and obliquely rounded before; substance of the shell rather thicker before; beaks very prominent, much inflated, incurved, and slightly undulate at the tip; ligament short and very thick; epidermis yellow and yellowish olive, polished, rayed, and with very distant lines of growth; umbonial slope raised into a sharp angle; cardinal teeth large, erect, compressed-conical, crenulate, double in both valves; lateral teeth rather short, lamellar, thick and slightly curved; anterior cicatrices distinct, both large and deeply impressed; posterior cicatrices nearly distinct; dorsal cicatrices placed on the under side of the cardinal teeth and the plate; cavity of the shell very deep, excavated and rounded; cavity of the beaks very deep and subangular; nacre white, sometimes pinkish and iridescent.

* Proc. Acad. Nat. Sci. Sept., 1856.

Soft Parts.—*Branchial uterus* enormously large, filling quite the whole of the posterior half of the outer branchiæ. This portion occupied by the branchial uterus is nearly semicircular, being nine-tenths of an inch long and one and a half inches wide, the inferior border being blackish. The branchial ovisacks in this specimen number twenty-eight on each side, and some of them are one-eighth of an inch in thickness and nine-tenths long. At the inferior end they are projected a quarter of an inch beyond the line of the branchial membrane. In general character the branchial ovisacks are like those of the well known *cariosus*, Say. *Branchiæ* large, nearly semicircular, inner ones larger in the anterior but smaller in the posterior portion of the abdominal sack. *Palpi* very large, oval, rather thick, oblique, and united only at the upper part of the posterior edges. *Mantle* rather thin, with a very broad pallear border, brown along the inferior edge and much thickened below the branchial opening, extending to a large reddish brown flat, fleshy appendage on each side, which is ramified into several points, flexible, extensile and retractile, the border between which and the branchial opening is very much thickened, and colored reddish brown. *Branchial opening* rather large, with numerous rather large, closely set, brownish papillæ on the inner edges. *Anal opening* small, with very small brownish papillæ on the edges. *Super-anal opening* rather small, united for some distance below, slightly colored on the edge. Color of the mass whitish.

Embryonic shell ovato-pouch-shape; color clear white.

Remarks.—I have had a number of this species a long time in my possession from Judge Tait and others, but considered it a well marked variety of *ovatus*, Say. But those from Othcalooga Creek and Etowah River, subsequently received, satisfy me that it is distinct. The specimen figured is a fine one from Othcalooga Creek, and among the largest I have seen. The females are very much inflated. The younger specimens have a very yellow, polished epidermis, with numerous distinct green rays (sometimes interrupted,) over the whole disk. The posterior slope is very much flattened, presenting a heart-shaped view, with a curved furrow on each side from beak to posterior margin, where it is terminated by a well marked opening between the valves. In some individuals the cardinal tooth of the right valve is disposed to be tripartite. The nacre of some is quite pinkish on the posterior portion. The lateral tooth of the right valve, always single, is enlarged at the posterior end and suddenly terminated.

UNIO UMBRANS. Pl. 13, fig. 53.

Testâ lævi, ellipticâ, ventricosâ, subæquilaterali, posticè obtusè angulatâ, compressâ et emarginatâ; valvulis crassis, anticè crassioribus; natibus prominulis; epidermide tenebroso-fuscâ, posticè obsoletè radiatâ; dentibus cardinalibus subgrandibus, erectis, obtuso-conicis, in utroque valvulo duplicibus; lateralibus sublongis, subrectis suberassisque; margaritâ tenebroso-purpureâ et iridescente.

Shell smooth, elliptical, ventricose, nearly equilateral, obtusely angular, com-

pressed behind, emarginate; valves thick, thicker before; beaks a little prominent; epidermis dark brown, obsoletely radiate behind; cardinal teeth rather large, erect and obtusely conical, double in both valves; lateral teeth rather long, somewhat straight and rather thick; nacre dark purple and iridescent.

Proc. Acad. Nat. Sci. 1857, p. 32, as *umbrosus*, which name was preoccupied.

Hab.—Othcalooga Creek, Gordon County, Georgia. Bishop Elliott.

My cabinet and cabinet of Bishop Elliott.

Diam. .7, Length 1, Breadth 1.4 inches.

Shell smooth, elliptical, ventricose, nearly equilateral, obtusely angular, compressed behind and regularly rounded before, emarginate at posterior basal margin; substance of the shell thick, much thicker before; beaks a little prominent, submedial; ligament short and rather thin; epidermis very dark brown, slightly polished, obsoletely radiate on posterior half, and with not very distinct lines of growth; umbonial slope rounded; cardinal teeth rather large, erect, crenulate and double in both valves; lateral teeth rather long, nearly straight and somewhat thick; anterior cicatrices very distinct and very much impressed; posterior cicatrices confluent and deeply impressed; dorsal cicatrices rather large, deeply impressed and placed in the centre of the cavity of the beaks; cavity of the shell rather deep and rounded; cavity of the beaks rather shallow and subangular; nacre dark purple and iridescent.

Soft Parts.—*Branchial uterus* situated on the posterior half of the outer branchiæ where the branchial ovisacks are large and colored on the lower edges. *Branchiæ* rather small, rounded below, the inner ones being much the larger, free only at the point of the abdominal sack. *Palpi* rather small, oval, thin, united only at the upper part of the posterior edges. *Mantle* rather thin, with a broad thick margin, the edges being purplish, below the branchial opening furnished with numerous dark brown or purplish papillæ. *Branchial opening* small, with very small brownish papillæ on the inner edges. *Anal opening* very small, with numerous very minute papillæ on the inner edges. *Super-anal opening* small, united below for some distance, dark purple or brown on the inside and outside of the edges. Color of the mass whitish, inclining to salmon color.

Embryonic shell clear white and pouch-shape, and very near to *obtus* (nobis) in outline.

Nearly all the branchial ovisacks were discharged, there being but few remaining on each side. The attachment of the branchiæ to the abdominal sack was not found to be alike on both sides, owing, perhaps to some injury, or malformation. The small opening mentioned above is on the right side, there being none on the left.

Remarks.—Only two of this species were received from Bishop Elliott. It is between *glans* (nobis) and *concestator* (nobis) in many of its characters. It has the deep purple of *glans* and is a little larger, but differs in the epidermis being more shining, browner and in having rays. It is much smaller than *concestator*, and by no

means so brilliant in the nacre, nor is it so dark in the epidermis. It is also near to *fullax* (nobis). On the side there is a disposition to yellowness, which exhibits the greenish rays.

UNIO OTHCALOOGENSIS. Pl. 14, fig. 54.

Testâ lævi, subtriangulari, ventricosâ, subæquilateralî; valvulis crassis, anticè crassioribus; natibus subgrandibus, ad apices undulatis; epidermide lutescente, perlævi, nitidâ, eradiatâ; dentibus cardinalibus crassis, obliquis, crenulatis et in utroque valvulvo duplicibus; lateralibus brevibus subrectisque; margaritâ albâ etiridescente.

Shell smooth, subtriangular, ventricose, subequilateral; valves thick, thicker before; beaks rather large, undulate at the tip; epidermis yellowish, very smooth and bright, without rays; cardinal teeth thick, oblique, crenulate and double in both valves; lateral teeth short and nearly straight, nacre white and iridescent.

Proc. Acad. Nat. Sci. 1857, p. 32.

Hab.—Othcalooga Creek, Gordon County, Georgia. Bishop Elliott.

My cabinet and cabinet of Bishop Elliott.

Diam. .6, Length .7, Breadth .8 inches.

Shell smooth, subtriangular, ventricose, nearly equilateral, obtuse behind and round before; substance of the shell thick, much thicker before; beaks rather large, minutely undulate at the tip; ligament very short and thin; epidermis yellowish inclined to orange, very smooth, highly polished, bright, without rays, and with a single line of growth near to the middle; umbonial slope very much rounded; cardinal teeth very large, oblique, very much crenulated and double in both valves; lateral teeth short, lamellar, rather thick and nearly straight; anterior cicatrices confluent and very deeply impressed, posterior cicatrices confluent; dorsal cicatrices small, placed nearly in the center of the cavity of the beak, under the cardinal tooth; cavity of the shell deep and rounded; cavity of the beaks shallow and subangular; nacre white and iridescent.

Soft Parts.—*Branchial uterus* situated on nearly two-thirds of the outer branchiæ, the branchial ovisacks being very full and comparatively large for so diminutive a species, and number about twelve on each side; the color whitish. *Branchiæ* very small, rounded below, the inner one a little the larger, united the whole length of abdominal sack. *Palpi* small, thin, transversely elongate, suboval, united a short distance on the posterior edges. *Mantle* thin, thickened at the pallear border and colored at the edge, crenulate below the branchial opening where it is also deeply colored and has a callus on each side. *Branchial opening* very small, with minute brownish papillæ on the inner edges. *Anal opening* very small, with very minute papillæ on the inner edges. *Super-anal opening* proportionately large, not colored on the edge, united for a short distance below. Color of the mass whitish.

Embryonic shell clear white, subrotund, and very near to *perplexus* (nobis) in outline.

Remarks.—Two specimens only were found by Bishop Elliott. They are both before me. It is among the smallest of the *Uniones*, and seems to be very rare. Both are females, and that figured shows the enlargement of the posterior portion about the umbonal slope, incidental to the female in so many species. The margin of this portion is disposed to be dentate. It is very nearly of the outline and general form and polish of *Haysianus*, (nobis,) but is yellow, smaller, has less dentation on the margin and it cannot be confounded with that species. It is the only very bright yellow species I know of so diminutive a size.

UNIO COLUMBENSIS. Pl. 14, fig. 55.

Testâ lævi, oblongâ, subinflâtâ, valdè inæquilaterali, posticè angulatâ; valvulis subcrassis; natibus prominulis, concentricè undulatis; epidermide tenebroso-fuscâ; dentibus cardinalibus subgrandibus, elevatis, acuminatis crenulatisque; lateralibus prælongis, lamellatis subrectisque; margaritâ albâ et iridescente.

Shell smooth, oblong, rather inflated, very inequilateral, angular behind; valves rather thick; beaks somewhat prominent and concentrically undulate; epidermis dark brown; cardinal teeth rather large, elevated, acuminate and crenulate; lateral teeth very long, lamellar and nearly straight; nacre white and iridescent.

Proc. Acad. Nat. Sci. 1857, p. 31.

Hab.—Creeks near Columbus, Georgia. Bishop Elliott.

My cabinet and cabinets of Bishop Elliott and Dr. Lewis.

Diam. 1·1,

Length 1·7,

Breadth 3·5 inches.

Shell smooth, oblong, rather inflated, very inequilateral, angular behind and rounded before, carinate on the posterior slope; substance of the shell rather thick; beaks somewhat prominent and concentrically undulate at tip; ligament very long and thin; epidermis dark brown, in the young yellowish brown, transversely very much striate; cardinal teeth rather large, elevated, pointed, crenulate and disposed to be double in both valves; lateral teeth very long, lamellar and nearly straight; anterior cicatrices distinct, the smaller one being larger than usual; posterior cicatrices confluent; dorsal cicatrices placed in the centre of the cavity of the beaks; cavity of the shell rather deep; cavity of the beaks rather shallow and subangular; nacre white and iridescent.

Soft parts.—*Branchial uterus* ——. Neither of the specimens before me have charged branchial ovisacks, but two are females and have ova in the ovarium. *Branchiæ* large, thin, inner one much the larger, free two thirds the length of abdominal sack. *Palpi* very large, larger than in *obesus*, thin, triangular and united half down the posterior edges. *Mantle* thickened and double along the edge, not colored except at siphonal openings. *Branchial opening* rather large, with small brownish papillæ on the inner edges. *Anal opening* large, with very minute papillæ on the inner edges. *Super-anal opening* very large, edges not colored, united below for a short distance. Color of the mass whitish.

Remarks.—This species belongs to that group of which *obesus*, (nobis,) may be con-

sidered the type. It seems to be nearest to *camptodon*, Say, and approaches *symetricus*, nobis. It is not so transverse as *camptodon*, nor so elliptical as *symetricus*. It is less angular behind than *declivis*, Say, and less inequilateral. The posterior slope has well marked impressed lines from the beaks to the margin. It seems to be entirely without rays, the epidermis being usually well covered with rough striae. The lines of growth are distant. All the specimens which I have seen have white nacre. The *obesus* is usually disposed to be of a dull purplish color.

UNIO APICINUS. Pl. 14, fig. 56.

Testâ lævi, ellipticâ, subcompressâ, subæquilaterali, posticè obtusè angulatâ; valvulis subtenuibus; natibus prominulis, ad apices regulariter et decorè undulatis; epidermide fusco-lutescente, radiis minutis indute; dentibus cardinalibus parvulis, obliquis, compressis, subacutis, in utroque valvulo duplicibus crenulatisque; lateralibus sublongis, lamellatis subcurvisque; margaritâ albidâ et iridescente.

Shell smooth, elliptical, rather compressed, nearly equilateral, obtusely angular behind; valves thin; beaks slightly prominent, at the tip regularly and beautifully undulate; epidermis yellowish brown and covered with small rays; cardinal teeth rather small, oblique, compressed, rather sharp, double in both valves and crenulate; lateral teeth rather long, lamellate and rather curved; nacre whitish and iridescent.

Proc. Acad. Nat. Sci. 1857, p. 32.

Hab.—Othcalooga Creek, Gordon County, Georgia. Bishop Elliott.

My cabinet and cabinet of Bishop Elliott.

Diam. .4,

Length .7,

Breadth 1.2 inches.

Shell smooth, elliptical, rather compressed, nearly equilateral, obtusely angular behind and rounded before; substance of the shell thin, a little thicker before; beaks slightly prominent at the tips, regularly and beautifully undulate, the undulations forming a sharp angle in the middle; ligament short and thin; epidermis yellowish brown and covered with small nearly equidistant rays; umbonial slope scarcely raised; cardinal teeth rather small, oblique, compressed, rather sharp, crenulate, double in both valves; lateral teeth rather long, lamellar and slightly curved; anterior cicatrices distinct; posterior cicatrices confluent; dorsal cicatrices placed on the underside of the plate posterior to cardinal tooth; cavity of the shell shallow; cavity of the beaks shallow and angular; nacre white and iridescent.

Soft Parts.—A male. *Branchiæ* thin, proportionately rather large, inner one much the larger, much rounded below, free two-thirds the length of abdominal sack. *Palpi* small, elongate, united but a small distance down the posterior edges. *Mantle* thin, dark brown at siphonal openings and on the basal margin. *Branchial opening* rather large, with small brownish papillæ on the inner edges. *Anal opening* large, with small brownish papillæ on the inner edges. *Super-anal opening* small and colored on inner edge, seems not to be united below. Color of the mass whitish.

Remarks.—Only a single specimen, and that a male, here figured, was received. It has nearly the outline of a young *pullatus* (nobis,) or *radiatus*, Lam. This is probably

a young individual, but I cannot place it with any described species. The nacre is slightly purple in the cavity of the beaks. The undulations of the beaks are uncommonly regular and very beautiful. In this specimen there are seven on each beak, all regularly succeeding each other and forming an acute angle in the middle.

UNIO INTERCEDENS. Pl. 15, fig. 57.

Testâ lævi, ellipticâ, subinflatâ, valdè inæquilaterali, posticè subangulatâ; valvulis subcrassis; natibus prominulis; epidermide tenebroso-fuscâ; posticè radiatâ, anticè subsulcatâ; dentibus cardinalibus parvis, angulatis, in utroque valvulo duplicibus; lateralibus longis, lamellatis subrectisque; margaritâ purpureâ et iridescente.

Shell smooth, elliptical, somewhat inflated, very inequilateral, subangular behind; valves somewhat thick; beaks a little prominent, epidermis dark brown, radiated behind and slightly furrowed before; cardinal teeth small, angular, double in both valves; lateral teeth long, lamellar and nearly straight; nacre purple and iridescent.

Proc. Acad. Nat. Sci. 1857, p. 32.

Hab.—Streams near Columbus, Georgia. Bishop Elliott.

My cabinet and cabinet of Bishop Elliott.

Diam. .8, Length 1.1, Breadth 1.9, inches.

Shell smooth, elliptical, somewhat inflated, very inequilateral, obtusely angular behind and rounded before; substance of the shell somewhat thick, thicker before; beaks a little prominent, ligament rather long and thin; epidermis dark brown, obscurely radiated behind and slightly furrowed before with rather distant marks of growth; umbonial slope slightly elevated and rounded; cardinal teeth small, angular, double in both valves and crenulate; lateral teeth long, lamellar and nearly straight; anterior cicatrices distinct and deeply impressed; posterior cicatrices confluent; dorsal cicatrices placed in the centre of the cavity of the beaks; cavity of the shell rather shallow; cavity of the beaks very shallow and subangular: nacre purple and iridescent.

Soft Parts.—A male. *Branchiæ* large, rounded below, inner ones much the larger, closed the whole length of abdominal sack. *Palpi* very large, thick, suboval, united more than half way down the posterior edges. *Mantle* thickened and double along the edge, colored below the branchial opening where there are small somewhat distant papillæ. *Branchial opening* large, with numerous small brownish papillæ on the inner edges. *Anal opening* rather large, with minute papillæ on the anterior edges. *Super-anal opening* rather small, inner edges colored, united below for some distance. Color of the mass whitish.

Remarks.—A single specimen, a male, in alcohol and several dry ones were received from Bishop Elliott. It belongs to the *fallax* group and inclines to *subellipsis* (nobis). It differs from the latter in color of the nacre and in the rays. It is a more com-

pressed shell than *fallax*. None had beaks perfect enough so that undulations could be observed.

UNIO PINGUIS. Pl. 15, fig. 58.

Testâ lævi, ellipticâ, inflatâ, valdè inæquilaterali; valvulis suberassis; natibus prominentibus, retrorsis; epidermide luteâ, obscurè radiatâ et politâ; dentibus cardinalibus subgrandibus, in utroque valvulo duplicibus, acuminatis crenulatisque; lateralibus magnis, lamellatis longis curvisque; margaritâ albâ et iridescente.

Shell smooth, elliptical, inflated, very inequilateral; valves rather thick; beaks prominent, recurved; epidermis yellowish, obscurely radiated and polished; cardinal teeth rather large, double, pointed and crenulate; lateral teeth large, lamellar, long and curved; nacre white and iridescent.

Proc. Acad. Nat. Sci., 1857, p. 84.

Hab.—St. Peter's River, upper Mississippi. B. W. Budd, M. D.

Cabinet of Dr. Budd. New York.

Diam. 1·3,

Length 1·9,

Breadth 2·7 inches.

Shell smooth, elliptical, inflated, very inequilateral, angular anterior to the beaks; substance of the shell rather thick, thinner behind; beaks prominent, incurved and recurved; epidermis yellowish, darker towards the beaks, obscurely rayed and shining; ligament rather short and thick; umbonial slope rounded and closely approaching the margin; anterior slope very much contracted; cardinal teeth rather large, and double in both valves, pointed, crenulate, compressed and slightly curved; lateral teeth large, lamellar, long, curved, single in the right and double in the left valve; anterior cicatrices distinct, the superior one large and deeply impressed; posterior cicatrices confluent; dorsal cicatrices placed within the cavity of the beak and on the outside of the cardinal tooth; pallear cicatrix well impressed; cavity of the shell deep and rounded; cavity of the beaks deep and subangular; nacre silvery white and iridescent.

Remarks.—A single specimen only was procured by Dr. Budd, and therefore the diagnosis is necessarily made without a knowledge of any variations of form in other individuals. It belongs to a group the type of which may be considered to be *legamentinus*, Lam., (*crassus*, Say,) but it differs in being less ponderous and more inflated. It is less oblique than that species and rather more rounded. It differs from another of this group to which it is nearly allied, *orbiculatus*, Hild., in being thinner, more inflated and more regularly rounded at the anterior margin. The anterior lunule is very wide, and a remarkable character is in the unusual swelling of the anterior portion of the disks, the greatest transverse diameter being towards the anterior portion of the shell. The cardinal teeth are remarkably erect and pointed, and the lateral teeth very lamellar and abrupt at the posterior end.

UNIO FALLAX. Pl. 15, fig. 59.

Testâ lævi, ellipticâ, subinflatâ, inæquilaterali, anticè et posticè regulariter rotundatâ; valvulis-subtenuibus; natibus prominulis, ad apicem minutè undulatâ; epidermide luteo-fuscâ, radiatâ; dentibus cardinalibus erectis, compressis, acuminatis, in utroque valvulo duplicibus; lateralibus subrectis sublongisque; margaritâ vel albâ vel pupureâ vel salmonis colore tinctâ et valdè iridescente.

Shell smooth, elliptical, somewhat inflated, regularly rounded before and behind; valves rather thin; beaks a little prominent, minutely undulate at the tip; epidermis yellowish brown, radiated; cardinal teeth erect, compressed, sharp and double in both valves; lateral teeth nearly straight and somewhat long; nacre white, purple or salmon, and very iridescent.

Proc. Acad. Nat. Sci., 1857, p. 32.

Hab.—Streams near Columbus, Georgia, Bishop Elliott; and French Broad River, Tennessee, Mr. Joseph Clark.

My cabinet and cabinets of Bishop Elliott and Mr. Clark.

Diam. .7, Length .1, Breadth 1.7 inches.

Shell smooth, elliptical, somewhat inflated, inequilateral, regularly rounded before and behind; substance of the shell rather thin, very slightly thickened before; beaks a little prominent, irregularly and minutely undulate at the tip; ligament rather long and thin; epidermis yellowish brown, sometimes reddish brown, with rather small rays more distinctly marked on the posterior half, the lines of growth being distant and strongly marked, shining on the umbones; umbonial slope rounded; cardinal teeth erect, compressed, oblique, sharp, crenulate, and double in both valves; lateral teeth long, thin, lamellar and nearly straight; anterior cicatrices distinct, posterior cicatrices confluent; dorsal cicatrices placed in the centre of the cavity of the beaks; cavity of the shell rather deep; cavity of the beaks shallow and subangular; nacre white, purple or salmon, and very iridescent.

Soft Parts.—*Branchial uterus* very large, occupying two-thirds, posteriorly, of the outer branchiæ, the branchial ovisacks, twelve to fifteen, being very large, extending a short distance below the line of the branchiæ, and having a whitish interrupted line at the lower margin. In the branchial ovisacks it is analogous to *heterodon*, (nobis.) *Branchiæ* large, nearly semicircular, inner ones much the larger, some individuals are free at the extreme point of abdominal sack, while others are closed altogether. *Palpi* very small, very thin, subangular, united only at the upper part of the posterior edges. *Mantle* very thin, much thickened at the margin where the edge is double, very much thickened below the branchial opening, where the edge is very dark and furnished with many rather distant papillæ. *Branchial opening* rather large, with very numerous small, brownish papillæ, crowded on the inner edges. *Anal opening* small, with very minute brownish papillæ on the inner edges. *Super-anal opening* small, colored on the edges, united for some distance below. Color of the mass whitish, inclining to salmon color.

Embryonic shell elongate, pouch-shape; color clear white.

Remarks.—A number of specimens of this rather small and pretty species I owe the possession of to Bishop Elliott and Mr. Clark. It is near to *intercedens*, (nobis,) and *Nashvillianus* (nobis,) and belongs to the group of which the latter may be considered the type. There are usually two lines of growth, both strongly marked, the superior one the more so. The nacre is usually purplish, but sometimes white, more often purple mixed with salmon color. The female form is very obtuse at posterior end and much inflated.

UNIO VIRENS. Pl. 16, fig. 60.

Testâ lævi, oblongâ, subinflatâ, posticè obtusè angulatâ, valdè inequilaterali; valvulis suberassis, anticè crassioribus; natibus parvis, prominulis; epidermide virido-olivâ, striatâ, vitatâ, obsoletè radiatâ; dentibus cardinalibus parvis, erectis, subcompressis crenulatisque; lateralibus prælongis, lamellatis rectisque; margaritâ cœrulo-albâ et iridescente.

Shell smooth, oblong, somewhat inflated, obtusely angular behind, inequilateral; valves rather thick, thicker before; beaks small, a little prominent; epidermis greenish olive, striate, banded, obsoletely rayed; cardinal teeth small, erect, rather compressed and crenulate; lateral teeth very long, lamellar and straight; nacre bluish white and iridescent.

Proc. Acad. Nat. Sci., 1857, p. 169.

Hab.—Georgia. Rev. G. White.

My cabinet and cabinet of Mr. White.

Diam. .9,

Length 1.3,

Breadth 2.7 inches.

Shell smooth, oblong, somewhat inflated, obtusely angular behind and obliquely rounded before; substance of the shell somewhat thick, thicker before; beaks small, a little prominent, wide; ligament rather long and thin; epidermis greenish olive, shining on the upper portion and roughly striate towards the margin, with very obscure rays, with very distant and strongly marked lines of growth; umbonial slope long and subangular; cardinal teeth small, erect, rather compressed, crenulate, single in the right and double in the left valve; lateral teeth very long, lamellar, straight and somewhat enlarged at posterior end; anterior cicatrices distinct, rather large, and well impressed; posterior cicatrices large and confluent; dorsal cicatrices small, and placed under the plate posterior to the cardinal tooth; cavity of the shell wide and rather shallow; cavity of the beaks very shallow and rounded; nacre white and iridescent.

Remarks.—I have only received from Mr. White one whole specimen and an odd left valve of this species. It belongs to the *complanatus* group, and resembles the wide white variety. It inclines very much to the form and appearance of *buxeus*, (nobis,) from South Carolina. It is longer than that species, and is not so shining or brown. In outline and obliqueness it reminds one of *Tuomeyi* (nobis.) The

nacre of the complete specimen is pure white, the odd valve is disposed to a salmon tint in the cavity of the shell. The obscure rays are like those of *complanatus*, and in more perfect specimens they may be more distinct than in those before me. The marks of growth are three in both specimens, exceedingly well marked with very distant, broad, dark bands.

UNIO SAVANNAHENSIS. Pl. 16, fig. 61.

Testâ lævi, oblongâ, inflatâ, ad latere planulatâ, posticè obtusè angulatâ, inæquilaterali, valvulis crassis, anticè crassioribus; natibus prominulis, ad apices undulatis; epidermide vel rufo-fuscâ vel tenebroso-fuscâ et obsoletè radiatâ; dentibus cardinalibus subgrandibus, pyramidatis, in utroque valvulo duplicibus; lateralibus prælongis, lamellatis curvisque; margaritâ vel albâ vel pallidâ purpureâ vel salmonis colore tinctâ et iridescente.

Shell smooth, oblong, inflated, flattened at the sides, obtusely angular behind, inequilateral; valves thick, thicker before; beaks a little prominent, undulated at the tip; epidermis reddish or dark brown, obscurely rayed; cardinal teeth rather large, pyramidal, double in both valves; lateral teeth very long, lamellar and curved; nacre white or pale purple or salmon color and iridescent.

Proc. Acad. Nat. Sci. 1857, p. 169.

Hab.—Savannah River, also Brantley's Mill, Washington County, Georgia, Rev. G. White; Santee Canal, South Carolina, Dr. Ravenel; and Sugar Creek, Mecklenburg County, North Carolina, C. M. Wheatley.

My cabinet and cabinets of Mr. White and Mr. Wheatley.

Diam. 1·4, Length 2·2, Breadth 3·9 inches.

Shell smooth, oblong, inflated, flattened at the sides, obtusely angular behind and regularly rounded before; inequilateral; substance of the shell thick, thicker before; beaks a little prominent, with numerous, small, concentric undulations at the tip; ligament rather long and thick; epidermis reddish brown or dark chestnut brown, somewhat bright on the umbones and striate and rough towards the margin, with obscure rays and distant well marked broad lines of growth; umbonial slope raised into a well defined angle; cardinal teeth rather large, pyramidal, crenulate, double in both valves; lateral teeth very long, lamellar, curved and enlarged at posterior end; anterior cicatrices distinct, large and deeply impressed; posterior cicatrices confluent, large and well impressed; dorsal cicatrices rather large, and placed across the centre of the cavity of the beak; pallear cicatrix deeply impressed; cavity of the shell rather deep and wide; cavity of the beaks shallow and rounded; nacre white, pale purple or salmon and iridescent.

Remarks.—Quite a number of specimens from Georgia and North and South Carolina were received, but none in alcohol. It belongs to the *complanatus* group, and is nearest to *Cuvierianus* (nobis.) It differs in being flatter on the side, more carinate on the umbonial slope and more striate. In the nacre it differs in being usually of a deep

salmon color or pale purple, rarely being white, which the *Cuvierianus* usually is. The specimens from the Santee Canal approach closer to *complanatus*. The lower division of the double lateral tooth is much enlarged in the adults towards the posterior end, and this in the single tooth in the right valve is curiously enlarged and blunted at the terminus.

UNIO SUBLATUS. Pl. 16, fig. 62.

Testâ lævi, transversâ, ad latere compressâ, posticè angulatâ, valdè inæquilaterali; valvulis subcrassis; natibus prominulis, ad apices undulatis; epidermide tenebroso-fuscâ, valdè radiatâ; dentibus cardinalibus parvis, subpyramidatis, crenulatis, in utroque valvulo duplicibus; lateralibus longis, lamellatis subrectisque; margaritâ purpureâ et iridescente.

Shell smooth, transverse, compressed at the side, angular behind, very inequilateral; valves rather thick; beaks a little prominent, undulate at the tip; epidermis dark brown, very much radiated; cardinal teeth small, somewhat pyramidal, crenulate, double in both valves; lateral teeth long, lamellar and nearly straight; nacre purple and iridescent.

Proc. Acad. Nat. Sci., 1857, p. 169.

Hab.—Uchee Bar, below Columbus, Georgia. Bishop Elliott.

My cabinet and cabinet of Bishop Elliott.

Diam. .5,

Length 1,

Breadth 2 inches.

Shell smooth, transverse, compressed and flattened at the sides, angular behind, regularly rounded before, very inequilateral; substance of the shell rather thick; beaks slightly prominent, undulate at the tip; ligament long and narrow; epidermis dark brown, smooth and shining, with numerous rays over the whole disk; umbonial slope slightly raised into an indistinct angle; cardinal teeth very small, somewhat pyramidal, crenulate and double in both valves; lateral teeth long, lamellar and nearly straight; anterior cicatrices distinct and well impressed; posterior cicatrices confluent; dorsal cicatrices small, and placed on the under side of the plate posterior to the cardinal tooth; cavity of the shell very shallow and wide; cavity of the beaks shallow and subangular; nacre purple and iridescent.

Soft Parts.—*Branchial uterus* situated on the whole of the outer branchiæ, except at the extreme ends. *Branchiæ* rather large, rather wide, much rounded below, the inner ones being somewhat the larger, free nearly the whole length of abdominal sack. *Palpi* rather small, thin, subtriangular, united at the upper portion of the posterior edges. *Mantle* thin, slightly thickened at the margin, which is without color. *Branchial opening* rather small, with numerous small reddish brown papillæ on the inner edges. *Anal opening* rather large, with very small reddish brown papillæ on the inner edges. *Super-anal opening* small, slightly colored inside, united for some distance below. Color of the mass whitish inclining to salmon color.

Embryonic young very near, in outline, to *ligamentinus*, Lam., but rather more rotund.

Remarks.—Two specimens only were received from Bishop Elliott. It is a species allied to *angustatus*, but not quite so wide. It has some resemblance to the young of *Hallenbeckii*, (nobis.) The posterior slope is carinate. The basal margin is disposed to be emarginate being compressed in the middle. The rays cover the whole disk, in these specimens, very beautifully, although they are very dark. Both the specimens before me are purple in the nacre. Other specimens may be white or salmon, but I suspect that purple will predominate.

UNIO TENEBRICUS. Pl. 17, fig. 63.

Testâ lævi, ellipticâ, subinflatâ, posticè obtusè angulatâ, inæquilaterali, valvulis tenuibus, anticè crassioribus; natibus prominulis; epidermide tenebroso-fuscâ, obsoletè radiatâ; dentibus cardinalibus parvis, valdè crenulatis, in utroque valvulo duplicibus; lateralibus lamellatis curvisque; margaritâ vel purpureâ vel salmonis colore tinetâ et iridescente.

Shell smooth, elliptical, slightly inflated, obtusely angular behind, inequilateral; valves thin, thicker before; beaks slightly prominent; epidermis dark brown and obsoletely radiated; cardinal teeth small, very much crenulate, double in both valves; lateral teeth lamellar and curved; nacre purple or salmon color and iridescent.

Proc. Acad. Nat. Sci., 1857, p. 171.

Hab.—Etowah River, Georgia. Bishop Elliott and Rev. Geo. White.

My cabinet and cabinets of Bishop Elliott, Mr. White and Mr. Bland.

Diam. .6, Length 1.1, Breadth 1.9 inches.

Shell smooth, elliptical, slightly inflated, obtusely angular behind and round before, inequilateral; substance of the shell thin, thicker before; beaks a little prominent, ligament rather short and thin; epidermis dark brown, obsoletely radiated, with rather distant marks of growth; cardinal teeth small, erect, pointed, very much crenulated and double in both valves; lateral teeth rather long, lamellar and curved; anterior cicatrices distinct and well impressed; posterior cicatrices confluent and very slightly impressed; dorsal cicatrices placed in the centre of the cavity of the beaks; cavity of the shell shallow and wide; cavity of the beaks rather shallow and rounded; nacre purple or salmon color and iridescent.

Soft Parts.—*Branchial uterus*——. Ova in ovarium, but none in the branchial ovisacks. *Branchiæ* very large, nearly semicircular, inner ones very much the larger, not free. *Palpi* small, thin, suboval, united only at the upper end of the posterior edges. *Mantle* thin, thickened at the margin and colored on the edges. *Branchial opening* rather large, with numerous dark brown papillæ on the inner edges. *Anal opening* small, with very small brown papillæ on the inner edges. *Super-anal opening* rather small, colored on the edges and united below. Color of the mass light salmon.

Remarks.—I have seen quite a number of this species. It belongs to that group of which *nitens* (nobis) may be considered the type. It is also allied to *Vanuxemii*

(nobis,) but is more oval. The posterior lobe of the cardinal tooth of the left valve is disposed to be divided, almost making it tripartite.

UNIO OBNUBILUS. Pl. 17, fig. 64.

Testâ lævi, ellipticâ, subcompressâ, posticé subbiangulatâ, inæquilaterali; valvulis suberassis; natibus prominulis, ad apices undulatis; epidermide tenebroso-fuscâ, eradiatâ, subnitens; dentibus cardinalibus subgrandibus, subpyramidatis, crenulatis, in utroque valvulo duplicibus; lateralibus longis, lamellatis curvisque; margaritâ purpureâ et iridescente.

Shell smooth, elliptical, somewhat compressed, subbiangular behind, inequilateral; valves somewhat thick; beaks a little prominent and undulate at the tip; epidermis dark brown, without rays and somewhat shining; cardinal teeth rather large, rather pyramidal, crenulate, double in both valves; lateral teeth long, lamellar and curved; nacre purple and iridescent.

Proc. Acad. Nat. Sci., 1857, p. 169.

Hab.—Buckhead Creek, Burke Co., Georgia. Bishop Elliott.

My cabinet and cabinet of Bishop Elliott.

Diam. .9,

Length 1.5,

Breadth 2.6 inches.

Shell smooth, elliptical, somewhat compressed, somewhat biangular behind and rounded before; substance of the shell somewhat thick, very slightly thicker before; beaks a little prominent, and placed towards the anterior margin, with numerous, somewhat irregular concentric undulations at the tip; ligament rather long and rather thin; epidermis dark brown, without rays, shining on the umbones, with rather distant marks of growth; umbonial slope somewhat raised and subangular; cardinal teeth rather large, rather pyramidal, crenulate and double in both valves; lateral teeth long, lamellar and curved, the lower division being usually much the larger; anterior cicatrices distinct, rather large and well impressed; posterior cicatrices large and confluent; dorsal cicatrices placed in the centre of the cavity of the beaks; cavity of the shell rather shallow and wide; cavity of the beaks shallow and rounded; nacre purple and iridescent.

Soft Parts.—*Branchial uterus* —. No ova in the branchial ovisacks, but immature ones were found in the ovarium. *Branchiæ* large, thin, nearly semicircular, rather oblique posteriorly, inner ones very much the larger, free more than half the length of abdominal sack. *Palpi* small, thin, subtriangular, united only at the upper portion of the posterior edges. *Mantle* thin, slightly thickened at the margin, being slightly colored at the edges, and crenulate below the branchial opening. *Branchial opening* rather large, with small, very dark brown papillæ on the inner edges. *Anal opening* very large, with numerous very small dark brown papillæ on the inner edges. *Super-anal opening* rather long, slightly colored on the inner edges and united for a short distance below. Color of the mass whitish.

Remarks.—A number of speciméns of this species were received from Bishop Elliott

in alcohol. The figure is of a male. The females are slightly enlarged over the umbonial slope. It belongs to the *complanatus* group, and is near to *confertus* and *rufusculus* (nobis.) It is more compressed, and the beaks are more terminal than in the first, and is not so much inflated, but more oblique than the latter. It is also near to *opacus* (nobis) from the same locality. It is more oblique, more compressed, and not so dark in the epidermis as that species, and the cardinal teeth are usually smaller. All the specimens received were entirely purple in the nacre, except one, which had a tint of salmon color mixed with the purple, and a partially white anterior margin. The undulations of the beaks are, in perfect young specimens, very distinct and very closely resemble those of *complanatus*. Some of the young are rayed nearly over the whole disk.

UNIO RUFUS. Pl. 17, fig. 65.

Testâ lævi, transversâ, valdè compressâ, ad latere planulatâ, posticè subbiangulatâ, valdè inæquilaterali; valvulis subcrassis; natibus prominulis; acuminatis; epidermide rufo-fuscâ, eradiatâ; dentibus cardinalibus parvis, obtuso-conicis crenulatisque; lateralibus sublongis, subcrassis, curvisque; margaritâ cæruleo-albâ et iridescente.

Shell smooth, transverse, much compressed, flattened at the side, subbiangular behind and very inequilateral; valves somewhat thick; beaks a little prominent, somewhat pointed; epidermis reddish brown, without rays; cardinal teeth small, obtusely conical and crenulate; lateral teeth rather long, somewhat thick and curved; nacre bluish white and iridescent.

Proc. Acad. Nat. Sci., 1857, p. 171.

Hab.—Etowah River, Cass County, Georgia. Bishop Elliott.

My cabinet and cabinet of Bishop Elliott.

Diam. .6,

Length 1.1,

Breadth 1.9 inches.

Shell smooth, transverse, much compressed, flattened at the sides, very inequilateral, subbiangular behind and regularly rounded before; substance of the shell rather thick, slightly thicker before; beaks a little prominent and somewhat pointed; ligament rather long and thin; epidermis reddish brown, darker on the posterior slope, without rays, shining on the umbones and striate at the margin; umbonial slope slightly raised into an obtuse angle; cardinal teeth small, obtusely conical and crenulate; lateral teeth rather long, somewhat thick and curved; anterior cicatrices distinct and well impressed; posterior cicatrices confluent; dorsal cicatrices placed under the plate posterior to the cardinal teeth; cavity of the shell very shallow; cavity of the beaks shallow and obtusely angular; nacre bluish white and iridescent.

Soft Parts.—*Branchial uterus* not charged, but ova were found in the ovarium of the two specimens received. *Branchiæ* large, thin, much rounded below, inner ones much the larger, free more than half the length of abdominal sack. *Palpi* small, suboval, united only at the upper part of the posterior edges. *Mantle* very

thin, with a broad border, slightly colored at the edge. *Branchial opening* rather large, with numerous small brown papillæ on the inner edges. *Anal opening* rather large, with very minute brown papillæ on the inner edges. *Super-anal opening* rather small, slightly colored within and united below for a short distance. Color of the mass whitish.

Remarks.—Only two specimens were received and these are not probably full grown. The largest being only one and three-quarter inches wide. It is very nearly allied to *phaseolus*, Hild., the outline being very nearly the same, but the posterior slope is higher than in that species. It is very much compressed at the sides and the basal margin is nearly or quite straight. There are no rays on the two before me, but more perfect specimens may sometimes be rayed.

UNIO OPACUS. Pl. 18, fig. 66.

Testâ lævi, ellipticâ, subinflatâ, posticè biangulatâ, inæquilaterali; valvulis subcrassis; natibus prominulis; epidermide vel tenebroso-fuscâ vel nigricente, subnitens; dentibus cardinalibus subgrandibus, elevatis, subpyramidatus crenulatisque; lateralibus longis, lamellatis subrectisque; margaritâ purpureâ et iridescente.

Shell smooth, elliptical, rather inflated, biangular behind, inequilateral; valves rather thick; beaks a little prominent; epidermis very dark brown or blackish; somewhat shining; cardinal teeth rather large, erect, subpyramidal and crenulate; lateral teeth long, lamellar and nearly straight; nacre purple and iridescent.

Proc. Acad. Nat. Sci. 1857, p. 169.

Hab.—Buckhead Creek, Burke County, Georgia. Bishop Elliott.

My cabinet and cabinet of Bishop Elliott.

Diam. 1, Length 1·5, Breadth 2·7 inches.

Shell smooth, elliptical, somewhat inflated, biangular behind and slightly truncate before, inequilateral; substance of the shell rather thick; beaks a little prominent; ligament rather short and somewhat thick; epidermis very dark brown, almost black, shining on the umbones and rather roughly striate towards the margin; umbonial slope somewhat raised and obtusely angular; cardinal teeth rather large, erect, somewhat pyramidal, crenulate, disposed to be double in both valves; lateral teeth long, lamellar and nearly straight; anterior cicatrices distinct and well impressed; posterior cicatrices confluent and slightly impressed; dorsal cicatrices nearly in the centre of the beaks; cavity of the shell rather shallow and wide; cavity of the beaks very shallow and round; nacre purple and iridescent.

Remarks.—This belongs to that portion of the *complanatus* group which includes *confertus*, *obnubilus*, *geminus* and *Lecontii*. It has a very regularly elliptical outline. At the posterior margin, where the two obtuse angles are formed, there is a slight twist which seems to be natural to this species.

UNIO VIRIDICATUS. Pl. 18, fig. 67.

Testâ lævi, suboblongâ, subcompressâ, posticè compressâ, biangulatâ, valdè inæquilaterali, valvulis subtenuibus; natibus prominulis, ad apices rugoso-undulatis; epidermide virescente, politâ, eradiatâ; dentibus cardinalibus parvis, subcompressis crenulatisque; lateralibus prælongis, lamellatis subrectisque; margaritâ cæruleo-albâ et iridescente.

Shell smooth, somewhat oblong, rather compressed, flat and biangular behind; very inequilateral; valves rather thin; beaks slightly prominent, at the beaks rugosely undulate; epidermis greenish, polished and without rays; cardinal teeth small, rather compressed and crenulate; lateral teeth very long, lamellar and nearly straight; nacre bluish white and iridescent.

Proc. Acad. Nat. Sci., 1857, p. 170.

Hab.—Buckhead Creek, Burke County, Georgia. Bishop Elliott.

My cabinet and cabinet of Bishop Elliott.

Diam. .9, Length 1.7, Breadth 3.1 inches.

Shell smooth, somewhat oblong, rather compressed, biangular, compressed behind and round before, very inequilateral; substance of the shell rather thin, slightly thicker before; beaks slightly prominent, rugosely undulate at the tip; ligament long and thin; epidermis greenish inclining to olive, without rays, shining on the umbones and striate towards the margin; umbonial slope slightly raised into an obtuse angle; cardinal teeth small, rather compressed, crenulate, pointed, single in the right and double in the left valve; lateral teeth very long, lamellar and nearly straight; anterior cicatrices rather large, distinct and impressed; posterior cicatrices confluent, and rather large; dorsal cicatrices placed across the centre of the cavity of the beaks; cavity of the shell very shallow and wide; cavity of the beaks shallow and rounded; nacre bluish white and iridescent.

Soft Parts.—*Branchial uterus* not charged, but ova were found in the ovarium. *Branchiæ* thin, very wide, rounded below, inner ones much the larger, free more than half the length of abdominal sack. *Palpi* very small, thin, oblique, subangular, very wide on the upper portion and united only at the upper part of the posterior edge. *Mantle* very thin, with a rather thin broad border. *Branchial opening* large, with numerous small dark brown papillæ on the inner edges. *Anal opening* very large, with very minute brown papillæ on the inner edges. *Super-anal opening* very large, slightly colored on the inner edges and united below for a small distance. Color of the mass whitish.

Remarks.—Several specimens were received from Bishop Elliott, and that figured is a female. It belongs to the *complanatus* group, and is very near to the thin white compressed varieties of that species. All the specimens had a white nacre. A single one was indistinctly rayed.

UNIO ÆQUATUS. Pl. 19, fig. 69.

Testâ lævi, ellipticâ, compressâ, posticè biangulatâ et planulatâ, valdè inæquilaterali; valvulis subcrassis; natibus prominulis; epidermide tenebroso-castaneâ, radiatâ, ad umbones politâ; dentibus cardinalibus subgrandibus, paulisper elevatis crenulatisque; lateralibus sublongis, lamellatis subrectisque; margaritâ vel albâ vel purpureâ vel salmonis colore tinctâ et iridescente.

Shell smooth, elliptical, compressed, very inequilateral, biangular and flattened behind; valves slightly thickened; beaks a little prominent; epidermis dark chestnut color, radiated, shining on the umbones; cardinal teeth rather large, somewhat erect and crenulate; lateral teeth long, lamellar and nearly straight; nacre white, purple or salmon color and iridescent.

Proc. Acad. Nat. Sci. 1857, p. 170.

Hab.—Buckhead Creek, Burke County, Georgia. Bishop Elliott.

My cabinet and cabinet of Bishop Elliott.

Diam. .9,

Length 1.5,

Breadth 2.7 inches.

Shell smooth, elliptical, compressed, very inequilateral, biangular and flattened behind and regularly rounded before; substance of the shell slightly thickened; ligament rather long and thin; epidermis dark chestnut color inclining to green, obscurely radiated, polished on the umbones, dull and striate towards the margin; umbonial slope flattish, with an obtuse angle; cardinal teeth rather large, somewhat erect, crenulate and disposed to be double in both valves; lateral teeth long, lamellar and nearly straight; anterior cicatrices distinct, rather large and well impressed; posterior cicatrices confluent, large and slightly impressed; dorsal cicatrices small and placed above the centre of the cavity of the beaks; cavity of the shell very shallow and wide; cavity of the beaks very shallow and rounded; nacre white, purple or salmon color and iridescent.

Soft Parts.—*Branchial uterus* not charged, but ova were found in the ovary. *Branchiæ* thin, very large, nearly semicircular, inner ones very much the larger anteriorly, free more than half the length of abdominal sack. *Palpi* remarkably small, thin, triangular, united only at the upper part of the posterior edges. *Mantle* very thin, slightly thickened on the broad margin and slightly colored at the edge. *Branchial opening* very large, bordered with black, with numerous small papillæ on the inner edges. *Anal opening* large, bordered with black and having very minute papillæ on the edge. *Super-anal opening* rather small, blackish on the inner edges, not united below, but free with the anal opening. Color of the mass whitish.

Remarks.—This species is perhaps nearest to *fumatus* (nobis,) but it leans to *Forbesianus*, (nobis,) a much thicker species. It is more compressed and more oval. It is dark on the posterior slope. The two angles on the posterior margin are more separate than in *fumatus*, and better defined.

UNIO SUBFLAVUS. Pl. 19, fig. 70.

Testâ lævi, ellipticâ, compressâ, posticè subbiangulatâ, inæquilaterali; valvulis crassis; natibus prominulis; epidermide velluteolâ vel luteo-castaneâ, vel obsoletè radiatâ vel eradiatâ; dentibus cardinalibus parvis, subconicis, crenulatis, in utroque valvulvo duplicibus; lateralibus longis, lamellatis subcurvisque; margaritâ vel salmonis colore tinctâ vel albidâ et iridescente.

Shell smooth, elliptical, compressed, subbiangular behind, inequilateral; valves thick; beaks slightly prominent; epidermis yellowish, inclined to chestnut; obsoletely rayed or without rays; cardinal teeth small, subconical, crenulate, double in both valves; lateral teeth long, lamellar and somewhat curved; nacre whitish or salmon color and iridescent.

Proc. Acad. Nat. Sci. 1857, p. 170.

Hab.—Walnut Creek, above Macon, Georgia. Bishop Elliott and J. C. Plant.

My cabinet and cabinets of Bishop Elliott and Mr. Plant.

Diam. .9,

Length 1.7,

Breadth 2.7 inches.

Shell smooth, elliptical, compressed, inequilateral, subbiangular behind and round before; substance of the shell thick, slightly thicker before; beaks slightly prominent; ligament long and thick; epidermis yellowish, inclined to chestnut, obscurely rayed or without rays, with rather distant distinct marks of growth; umbonial slope slightly raised into an obscure angle; cardinal teeth small, subconical, crenulate, double in both valves; lateral teeth stout, long, lamellar, and somewhat curved; anterior cicatrices distinct, large and well impressed; posterior cicatrices confluent, rather large and well impressed; dorsal cicatrices deep, rather small and placed above the centre of the cavity of the beaks; cavity of the shell very shallow and very wide; cavity of the beaks very small and rounded; nacre whitish or salmon color and iridescent.

Soft parts.—*Branchial uterus* filling nearly the whole of the outer branchiæ. *Branchiæ* thin, very large, rounded below, the inner ones much the larger and nearly semicircular, free more than half the length of abdominal sack. *Palpi* rather large, suboval, united only at the upper part of the posterior edges. *Mantle* very thin, thickened at the margin. *Branchial opening* rather small, with small brown papillæ on the inner edges. *Anal opening* rather small, with very minute brownish papillæ on the inner edges which are of a deeper brown. *Super-anal opening* rather small, with a brownish line on the interior margins, united below for a short distance. Color of the mass whitish, inclining to salmon.

Remarks.—A number of specimens were sent to me by Bishop Elliott. This species belongs to the extensive *complanatus* group. It is more oblique than the type and is near to *Stonensis* (nobis.) In all the specimens the nacre was more or less salmon, sometimes very pale, the white predominating. The cardinal teeth are very small.

UNIO SIMILIS. Pl. 19, fig. 71.

Testâ lævi, ellipticâ, subinflatâ, posticè subbiangulatâ, valdè inæquilaterali; valvulis subcrassis; natibus prominulis; epidermidè tenebroso-fuscâ, radiatâ, politâ; dentibus cardinalibus subgrandibus, subelevatis et subpyramidatis; lateralibus sublongis subcurvisque; margaritâ vel purpureâ vel albâ vel salmonis colore tinctâ et iridescente.

Shell smooth, elliptical, somewhat inflated, very inequilateral, subbiangular behind; valves somewhat thick; beaks a little prominent; epidermis dark brown, radiated and polished; cardinal teeth rather large, somewhat elevated and pyramidal; lateral teeth somewhat long and curved; nacre purple, white or salmon color and iridescent.

Proc. Acad. Nat. Sci. 1857, p. 169.

Hab.—Buckhead Creek, Burke County, Georgia. Bishop Elliott.

My cabinet and cabinet of Bishop Elliott.

Diam. .8, Length 1.2, Breadth 2.3 inches.

Shell smooth, elliptical, somewhat inflated, inequilateral, obtusely biangular behind and subtruncate before; substance of the shell somewhat thick, slightly thicker before; beaks a little prominent; ligament rather long and somewhat thick; epidermis dark brown, radiated over the whole disk, polished on the umbones and striate near the margin, with obscure rather distant lines of growth; umbonial slope raised and very much rounded; cardinal teeth rather large, somewhat elevated into a pyramidal form, crenulate and slightly disposed to be double in the right valve; lateral teeth somewhat long, lamellar and slightly curved; anterior cicatrices distinct and deeply impressed; posterior cicatrices confluent, large and indistinctly impressed; dorsal cicatrices small, and placed in the centre of the cavity of the beaks; cavity of the shell rather deep and wide; cavity of the beaks shallow and rounded; nacre purple, white or salmon color and iridescent.

Soft Parts.—*Branchial uterus* filling nearly the whole of the outer branchiæ. *Branchiæ* moderately large, rounded below, the inner ones somewhat the larger, free three fourths of the length of the abdominal sack. *Palpi* small, suboval, thin, united only at the upper part of the posterior edges. *Mantle* thin, slightly thickened at the margin. *Branchial opening* rather large, with numerous dark brown papillæ on the inner edges. *Anal opening* large, with numerous very minute brown papillæ on the inner edges. *Super-anal opening* large, slightly colored within and united below for a short distance. Color of the mass whitish.

Embryonic shell clear white and very nearly the same form as *Othcaloogensis* (nobis.)

Remarks.—This belongs to the group of which *Geddingsianus*, (nobis,) may be considered the type. It is near to *Whiteianus* (nobis.) Its epidermis is polished like both species. In the character of the rays it resembles *Geddingsianus*. It is less polished on the sides than *Whiteianus*, which usually has no rays.

UNIO AQUILUS. Pl. 20, fig. 72.

Testâ lævi, transversâ, subcompressâ, posticè angulatâ, valdè inæquilaterali; valvulis crassiusculis; natibus prominulis, ad apices rugoso-undulatis; epidermide tenebroso-fuscâ, nigricante, obsoletè radiatâ, transversè striatâ; dentibus cardinalibus parviusculis, subelevatis crenulatisque; lateralibus prælongis, lamellatis subrectisque; margaritâ vel purpureâ vel albâ et valdè iridescente.

Shell smooth, transverse, somewhat compressed, angular behind, very inequilateral; valves somewhat thick; beaks slightly prominent, rugosely undulate at the tip; epidermis dark brown, blackish, obscurely rayed, transversely striate; cardinal teeth rather small, somewhat erect and crenulate; lateral teeth very long, lamellar and nearly straight; nacre white or purple and very iridescent.

Proc. Acad. Nat. Sci. 1857, p. 172.

Hab.—Flint River, near Macon, Georgia, J. C. Plant; and Chattahooche River at Roswell, Georgia, N. A. Pratt, Jr.

My cabinet and cabinets of Mr. Plant and Mr. Pratt.

Diam. .7,

Length 1.3,

Breadth 2.6 inches.

Shell smooth, transverse, somewhat compressed, very inequilateral, angular behind and regularly rounded before; substance of the shell somewhat thick, slightly thicker before; beaks a little prominent, with a number of rather rough, subconcentric undulations at the tip; ligament rather long and thin; epidermis dark brown, blackish, obscurely rayed, shining on the umbones and transversely striate, with three or four rather distant and broad lines of growth; umbonial slope slightly elevated into an obtuse angle; cardinal teeth rather small, somewhat erect, oblique, beautifully striate, single in the right and double in the left valve; lateral teeth very long, lamellar, nearly straight and enlarged at the posterior end; anterior cicatrices distinct and well impressed; posterior cicatrices confluent and very slightly impressed; dorsal cicatrices deeply impressed and placed in the centre of the cavity of the beaks; cavity of the shell shallow and wide; cavity of the beaks very shallow and rounded; nacre white or purple and very iridescent.

Soft Parts.—*Branchial uterus* not charged, but ova were found in the ovarium. *Branchiæ* large, thin, rounded below, inner one much the larger, free nearly the whole length of abdominal sack. *Palpi* rather long, suboval, thin, united only a short distance on the upper posterior edges. *Mantle* thin, with a rather broad margin. *Branchial opening* rather small, with coarse brown papillæ on the inner edges. *Anal opening* small, with very small brown papillæ on the inner edges. *Super-anal opening* large, colored on the inner edges, and united for a short distance below. Color of the mass whitish.

Remarks.—Quite a number of this species of all ages were received from Mr. Plant and Mr. Pratt, with others, in alcohol. In outline and many of its characters it is closely allied to *nasutus*, Say, and forms a handsome and well characterized member of the group of which that is the type. It is not so transverse, and the undulations of the

beaks are coarser. The young have beautiful dark green rays over the whole disk, but they disappear on approach to adolescence, and the whole surface becomes very dark. On the posterior slope of the young shell the rays are capillary and very distinctly marked. On the sides of some of the adult specimens there are a few nearly parallel perpendicular indistinct folds, which character is sometimes observed in *nasutus*.

UNIO MACONENSIS. Pl. 20, fig. 73.

Testâ lævi, valdè transversâ, subcompressâ, ad latere planulatâ, valdè inæquilaterali, posticè subbiangulatâ; valvulis subtenuibus; natibus prominulis; epidermide tenebroso-fuscâ, obsoletè radiatâ; dentibus cardinalibus parviusculis; compressis, triangularis, crenulatis, in utroque valvulo duplicibus; lateralibus prælongis, lamellatis rectisque; margaritâ purpurecente et iridescente.

Shell smooth, transverse, rather compressed, subbiangular behind, very inequilateral; valves rather thin; beaks slightly prominent; epidermis dark brown, striate; cardinal teeth rather small, compressed, triangular, crenulate double in both valves; lateral teeth very long, lamellar and nearly straight; nacre purple and iridescent.

Proc. Acad. Nat. Sci. 1857, p. 172.

Hab.—Flint River, near Macon, Georgia. J. C. Plant.

My cabinet and cabinet of Mr. Plant.

Diam. .8,

Length 1.5,

Breadth 3.3 inches.

Shell smooth, transverse, rather compressed, flattened at the side, very inequilateral, subbiangular behind, obliquely rounded before; substance of the shell rather thin; beaks slightly prominent; ligament long and thin; epidermis dark brown, striate, without rays; umbonial slope raised into a well defined angle; cardinal teeth rather small, compressed, triangular, crenulate, oblique and double in both valves; lateral teeth very long, lamellar and nearly straight; anterior cicatrices distinct and moderately impressed; posterior cicatrices confluent, scarcely perceptible; dorsal cicatrices small and placed in the centre of the cavity of the beaks; cavity of the shell rather shallow and wide; cavity of the beaks very shallow and rounded; nacre purple and iridescent.

Soft Parts.—*Branchial uterus* not charged, but ova were found in the ovary. *Branchiæ* very wide, thin, slightly curved below, posteriorly very oblique, inner ones somewhat the larger, free more than half the length of abdominal sack. The posterior ends do not reach the edge of the mantle, but are attached to it by a filament. *Palpi* rather large, rounded below, angular behind, united about one-third down the posterior edges. *Mantle* thin, slightly thickened at the margin, which is broad. *Branchial opening* rather small, with numerous small brown papillæ on the inner edges. *Anal opening* large, with numerous very small dark brown papillæ on the inner edges. *Super-anal opening* long, slightly colored on inner edges, united for some distance below.* Color of the mass a light salmon tint.

*Two individuals have their edges united also in the middle.

The abdominal sack with the foot both very small, and the larger portion of the branchiæ are posterior to the abdominal sack.

Remarks.—A number of specimens in alcohol were received from Mr. Plant. It is nearly allied to *extensus* (nobis), but is more compressed, and the angle on the umbonial slope is more pronounced and the epidermis is darker. I have not seen any young individuals, and therefore cannot say if they ever have any rays, nor can I give the character of the undulations of the beaks.

UNIO NAVICULOIDES. Pl. 20, fig. 74.

Testâ lævi, transversâ, subinflatâ, posticè biangulatâ, valdè inequilaterali; valvulis tenuibus; natibus prominulis; epidermide tenebroso-fuscâ, eradiatâ, striatâ; dentibus cardinalibus parvis, compressis, trigonis, in utroque valvulo duplicibus crenulatisque; lateralibus prælongis, lamellatis subrectisque; margaritâ purpureâ et iridescente.

Shell smooth, transverse, somewhat inflated, biangular behind, very inequilateral; valves thin; beaks a little prominent; epidermis dark brown, without rays, striate; cardinal teeth small, compressed, triangular, double in both valves and crenulate; lateral teeth very long, lamellar and nearly straight; nacre purple and iridescent.

Proc. Acad. Nat. Sci., 1857, p. 170.

Hab.—Buckhead Creek, Burke County, Bishop Elliott; and Macon, Georgia, J. C. Plant.

My cabinet and cabinets of Bishop Elliott and Mr. Plant.

Diam. .8,

Length 1.3,

Breadth 3 inches.

Shell smooth, transverse, somewhat inflated, very inequilateral, biangular behind and regularly rounded before; substance of the shell thin; beaks slightly prominent; ligament long and thin; epidermis dark brown, striate, without rays, with numerous well marked lines of growth; umbonial slope raised into an obtuse angle; cardinal teeth small, compressed, triangular, crenulate, oblique, and double in both valves; lateral teeth very long, lamellar and nearly straight; anterior cicatrices distinct and moderately impressed; posterior cicatrices confluent and scarcely perceptible; dorsal cicatrices very small and placed in the centre of the cavity of the beaks; cavity of the shell rather shallow and wide; cavity of the beaks very shallow and rounded; nacre purple and iridescent.

Soft Parts.—*Branchial uterus* charged the whole width, except at the extreme ends. *Branchiæ* large, gently curved below, the inner one much the larger, free about two-thirds the length of abdominal sack. *Palpi* rather small, transverse, sub-oval, united only at the upper part of the posterior edges. *Mantle* thin, slightly thickened at the margin which is rather broad. *Branchial opening* rather large, angular below, with numerous small brownish papillæ on the inner edges. *Anal opening* large, with numerous very small brownish papillæ on the inner edges. *Super-anal opening* rather small, united below for some distance. Color of the mass whitish.

The description of soft parts is made from specimens from Macon; while the exterior enveloping hard parts are described and figured from Buckhead Creek specimens.

Remarks.—Quite a number were received from Mr. Plant, in alcohol. The species belongs to the group of which *angustatus* may be considered the type. It is not so wide, but thinner and more inflated than that shell. It is very closely allied to *Maconensis*, (nobis,) but differs in the umbonial slope, not being so angular, and in having a blunt truncate posterior margin well defined by two angles. It is also thinner in the substance of the shell, and the epidermis is not so dark and is not quite so smooth. There is a marked difference between the specimens from the two localities, and they may be found, when better observed, to be really distinct species.

ART. V.—*Synopsis of North American Sphingidæ.*

BY BRACKENRIDGE CLEMENS, M. D.

I. CLASSIFICATION.

The arrangement of the family Sphingidæ, as presented in the present paper, is doubtless defective in many respects. It is systematic, however, and its errors will become obvious when we acquire that information respecting species, on which the construction of a natural system depends. This latter does not contemplate merely isolated characters of perfected beings, in the endeavor to reproduce the order and harmony of creation. It cannot be said that the intrinsic value of external characters in Lepidoptera has been yet philosophically determined; still it is obvious, that each individual at its maturity must be the representative of its family, its genus and species, and bears with it the characters peculiar to each of these groups. There is nothing in the structure of the perfect lepidopterous insect that reveals to us the peculiarities of its anterior specific history, and in studying its characteristics in a state of maturity, we view the climax of its organic perfection, contemplate it as having reached the end of its biography, and can systematize it according to the method that may be used for this purpose, but with no surety that its position represents those natural relations that every system should endeavor to display, as long as the diagnostic characters of groups of perfect beings have indefinite and undetermined values, or as long as the particulars of its embryonic life are unascertained. The imago is usually spoken of as *the species*, whereas it is simply part of the existence of species, which has had an inception, an embryonic life, a youth and conditions of growth, during which it has maintained special relations to inanimate agencies and to other beings.

Classification is not arbitrary or objectless. It seeks by convenient generalizations of our own creation to reproduce to view that order established in the beginning, and to represent the analogies and affinities existing between different groups and the individuals of which they are composed. A natural system is simply a representation of natural bodies with all their relationships ascertained, and its peculiar office is to develop the concealed idea pertaining to every group, by which it is characteristically designated, and the thought, of which every being is but the

expression. It is through this medium that animated nature appeals to our internal perceptions, and these evidences of thought are not adventitious and subject to change or fluctuation, but ordained and immutable, and are the recondite expressions of the Divine mind in which they had their origin. Thus emanating from the Source of all Intelligence, natural bodies are not only perfect in structure and specially adapted to fulfil the conditions for which they were created, but the concatenation of their relationships to physical and animated nature, and amongst themselves, when once all these are known, must present a series of logical and natural sequences, which are at once the source and aim of all conceptions of method. The systematist is the mere interpreter of what already exists, and his work is enduring in proportion as it represents natural bodies as they are found in nature. What, then, is requisite to form a conception of the concealed idea of each group, and in what consists these ideas which appeal to our intelligence for recognition?

1st. A knowledge of all the mature forms belonging to any particular group; their peculiarities of structure, both external and internal; the figures, physiological offices and structure of all the external organs.

2d. The embryonic forms and changes of individuals, or the details of their structural evolution from the ova to maturity.

3d. The habits of both the active embryo and the perfect individual.

It must be perfectly obvious, that the more absolute is the harmony or coincidence between groups and individuals established by these details, the more intimate must be the degree of natural relationship, until during the process of comparison which is thus instituted, we reach a group in which the results of observation, the physiological and ultimate peculiarities of structure, become absolutely identical, and we are unable to ascertain the existence of further disagreements or any essential difference. We have here, indeed, a reproduction of some special form and a repetition of the same biography, and this constitutes the last and most intimate degree of natural affinity. From this point, which we may regard as that of coincidence, the relationships of the individual radiate in every conceivable direction, and display various degrees of intimacy within the limits of genera, families, orders and classes. In accordance with the thought expressed in the creation of each special form, the more or less coincident or divergent results of observation, of the physiological structure and office of the external and internal organs, of form and adaptation to particular modes of life, result those conceptions of *resemblance*, of *conformity* or *absolute identity* in individuals, which it is the aim of the methodist to represent in his generalizations. Whatever may be the nature of these, whether natural or artificial; they are simplified by the description of certain easily recognized diagnostic characters, usually drawn from anatomical and structural peculiarities of the perfect being, and supposed to represent variations or agreements of internal structure.

SPECIES.

In the endeavor to form a conception of what constitutes *species*, our ideas must be separated from the *individual*, which is merely the representative of species in some one of its special states or conditions. Every mature or perfected being has had an anterior organic history, included in the history of its structural progression from a collection of simple cells to a natural body, possessing individual and distinctive characteristics. No one of its states or conditions constitute species; neither the perfect insect, nor the pupa, nor the larva, nor the ovum, fulfil in themselves the conception involved in this term, but simply *represent* the various relations the individual maintains to physical and animated nature, and during the continuance of which its structural and peculiar biography is written. The perfect being is the temporary expression of a thought or conception, involved in the series of actions which constitute in their entity a special and definite creation, and in this state has reached the acme of its perfectibility, a point beyond which it cannot pass; but, after a variable period, its organic part is broken up, and resolved again into the simple or primary elements of matter. The species or the thought, however, does not cease to exist during the process of organic disintegration of the individual; and previously to its disappearance or death, it represents its special organism, or rather its *species*, by means of an ovum, in which the organic actions destroyed in the previous representative are recommenced, and again carried through a series of changes or states to the point of its previous organic perfection. Commencing in the simplest organic state, and continually returning to it to renew a series of predetermined special developments, we have in species a cycle of persistent, ceaseless actions, revolving in their narrow, humble orbit, with all the indications of design, and with comparatively as much invariability as the great planets observe in their appointed paths. It is a conception, inasmuch as from a structureless body or material is evolved in a constant, preordained manner, one having a highly complicated arrangement of organs, whose actions and functions result in the production of phenomena known as those of life. The ovum, in which the organic cycle may be said to have its inception, is endowed with no fortuitous or independent impulse of evolution. Up to the period of its maturity, it has formed an integral and necessary part of some pre-existing natural body; it is indeed, a component of the organism, quite as much as any other aggregation of specialized cells, and partakes of all its characteristics of growth. To endow it with this impulse, not even the procreative act, between the male and female organism, is absolutely imperative, and its specific evolution may be recommenced independently of this extraneous aid, at the inceptive point of the organism with which it has been identified, and continued to the production of a new perfect being. It is of little consequence in how few or many instances this tendency is capable of

manifesting itself, or what fractional part of the organic cycle is passed over by the unaided impulse toward developement, in the great majority of animal bodies. The fact now indisputably established by Von Siebold,* that the eggs of a virgin moth secluded from access to the male with the most watchful and guarded care, unquestionably produce a progeny of new beings indistinguishable from those which had preceded them, determines the possibility of structural evolution through all the terms of at least one entire cycle, independently of any influence derived from the sperm cells of the male. The regenerative tendency in the ovum must hence be a specific endowment, resulting in the production of a perfect being as a general law, only when aided by the sperm cells of the male, but analogous in its nature to reproduction by gemmation, to the formation of new beings from the division of a perfect Hydra, to the evolution of new members to replace those which have been lost. In a word, regeneration is a manifestation of continuous growth in species, in their respective cycles of organic evolution, around which the structural processes revolve and repeat continuously and precisely, what had been accomplished by pre-existing representative bodies, without power to exceed or restrict a designated and preordained orbit. And for each, there is a persisting life, never intermitted for an instant of time, running through a chain of representative bodies, and reaching from the first created conception not only to the present time, but into that future when organic existence shall have terminated. This produces, and must continue to produce successive representatives, which harmonize and agree with the original and inceptive organism, and are not only similar to it, but identical amongst themselves. The mind can detect no essential differences on which to establish distinctions, and we recognize them as the same beings, the same conception, whatever may be their geographical origin; all structural differences have disappeared, and investigation proves that each individual repeats and reiterates one and the same biography with all its distinctive peculiarities.

The identity of natural bodies of the same species must, however, be received with certain limitations. In no portion of the organic, or even the physical world, does Nature work within the limits of inflexibly parallel lines, but mingles with her laws of harmony or invariability, *laws of disorder*, which affect the most stupendous and apparently most stable of her works, as well as the most humble and insignificant, if any thing in Nature can be so regarded. Thus, in considering specific life in the humble forms under view, we must allow a limit of *variability* or *disorder*, by which constancy in results are affected or apparently deranged, but within circumscribed boundaries. The subject of variation in insects has been so imperfectly investigated, and so many startling theories have been promulgated respecting it, founded on what I must regard as mistaken conceptions respecting the nature of species, that although

*True Parthenogenesis in Moths and Bees, London, 1857.

we have no special investigations to offer on the question, we can at least clear and define our conceptions with respect to what should be regarded a variety of a species.

From what has been heretofore said respecting species, we cannot suppose a variety can be detected, simply from the study of the perfect insect in its most aberrant condition. For wherein does a variety differ from the species? by what means is the systematist enabled to ascertain the specific identity of those individuals, which have been described as distinct species? Is it by any difference in the ovum, any peculiarity in the form, structure, ornamentation or biography of the embryo, any differences in pupation, or any essential or specific variation in the structure of the perfect insect? By no means. To be a variety, or wandering from a certain specific type, it must observe the same biographical and organic cycle, possess the same specific characteristics of structure in its perfect state, but differ from the species in its peculiarities of ornamentation, and in its size, perhaps, to a degree that without a knowledge of its embryology and biography, it would be pronounced and registered distinct from the perfect individuals towards which it shows the strongest specific affinities of structure. Another characteristic of the variety is, that there is no stability even in the peculiarities of its ornamentation; and whether it occurs in the same brood under identical climatal conditions, or is found as an isolated perfect being in a widely separated geographical area under dissimilar conditions, it must be associated with its *normal type*; and that the ova of the variety will reproduce, not only this, but also more or less aberrant perfect individuals. An invariable, fixed and constantly recurring ornamentation in any group of perfect beings, except when it is a mere intensity or pallidness of hue, which will but rarely mislead, is not only incompatible with the conception of a variety, but would constitute a true species even when their biographies are closely coincident. Variation, or specific instability, observing fixed and determined limits which must be ascertained by observation, is part of the true history of species. It is not manifested to the same degree, probably, in the specific life of every true species, but wheresoever and whensoever it does occur, is capable of being referred to its normal type, by its agreement in all those essential characteristics necessary to form a conception of true species. As long as the specific diagnosis must be confined to a description of the ornamentation of the perfect being, there are no means of distinguishing certainly the variety from species, should the former differ from the latter essentially in this respect, and I have no doubt that every effort at systemization with a knowledge of perfect forms alone, contains many illustrations of the attendant difficulties of discrimination.

It is not my desire to enter into any special discussion of this subject; it is sufficient to enunciate what I believe truth, and apparent to my own mind. Discussions must be founded either on principles or prejudices; if the former should differ, there can

be no advance until the truth is made apparent, by a surer mode than that which is so apt to degenerate into sophistication, and if the latter is the basis on which it is conducted, it is needless to say, it never has nor never can effect any good.

While seeking to avoid this latter influence, it will be proper in the present connection to notice, in a very concise manner, the views of an apparently numerous and increasing body of naturalists, who advocate the existence of permanent and geographical varieties, resulting from the effect of physical agencies on the animal organism; and the tendency, on the other hand, of species and varieties to depart indefinitely from the original type. I cannot but think these opinions have arisen as the consequence of an exceedingly limited view of the nature of species, and from the study and comparison of perfect beings exclusively. Another obvious source of fallacy in the reasoning by which such views are supported, is to include in the abstract treatment of the nature of species or variety, what we know obtains amongst animals in a state of domestication or civilization; since it is, at least, a subject of grave doubt, whether domestic varieties have not proceeded from the admixture of several originally distinct species. Whilst it is a doubtful question, no illustration can be drawn from this source, and we must look for the determination of important questions, from the internal evidence presented in the study of special orders, and perhaps especially amongst the humble beings. Neither do I imagine any light can be derived from the action of physical influences on the vegetable organism, however similar may be the nature of the vegetative process in the two organic kingdoms; for, the very condition of life in the one, is absolutely dependent on them, not only for its inception, but for subsequent continuance; whilst the other is in no wise thus circumstanced within the limits of variations not actually and immediately destructive. Surely the consideration of the nature of species and varieties is important, obscure and difficult enough without being further complicated and confused, by brilliantly conceived theories, when facts should be sought for, or by mere postulatory reasoning founded on suppositious events.

The existence of modified individuals, under different climatal conditions, is no proof in itself, that the modifications of structure or ornamentation are the consequence of the operation of physical influences, particularly when we are acquainted only with the perfect insect. Independently of the consideration that they are constantly met with under all climatal conditions, the idea of species includes certain established and ordained relations to physical agencies, which, so far from being adventitious in their operation, are part of its history. And with the original conception must have been likewise predetermined, those *products of disorder* that harmonize completely with the dominant idea although presenting differences—the adaptability to certain modes of life, the form and structure, the relations of species to its natural enemies, and its instruments and means of defense, and its resources for

the sustenance of life. For, if this be not true, what significance can we assign to the harmony and intelligent design, everywhere characterizing the relationships of organic nature? The natural history of the earth teaches us to believe, that physical influences were established antecedent to the creation of organic bodies, and we know that vegetable forms, being producers or creators from the simple elements of the material for the sustenance of the animal, must likewise have been its precursor, and we must look for adaptability in the latter to the conditions under which it was to pass its life, and not that it is capable of being indefinitely molded, modified and controlled by the existence of agencies and conditions, which had fully recognized and established existence, previously to its appearance upon the earth. I know, as well as any one, there is nothing like positive organic immobility or fixity in the animal organism; that it is a scene of constant, perpetual fluctuation; that the condition of life is one of change, waste and renovation throughout its continuance, but under an immutable and predetermined plan, comprehending a certain degree of adaptiveness, by which it is accommodated to the unequal action of the conditions under which it may exist. Within this limit the operation of organic processes are evidently, one may say eminently, influenced by physical agencies. Cold depresses and retards their action and development; heat stimulates and advances, and the animal being incapable of generating or creating a single element of the simplest of its constituents, but assimilating those already prepared for its use by other organisms, scarcity or abundance of food likewise affect it. And though this more than either the influences mentioned may produce physical degeneration, yet even combined with the external agents is there a single fact in physiological science which justifies the belief, that they influence cell development in any other manner, save that of disease, leading not only to the extermination of the individual, but of its progeny? Contemplate the climatal changes, and the altered facilities of obtaining sustenance as taking place almost insensibly, and extending their range of effects into geological periods, adding isolation to intensify their influence, and where must permanent variation of species, or the tendency to change indefinitely, have its inception? Beyond doubt, as the advocates of the latter doctrine especially claim, in the cell-action of the reproductive system. If this is capable of undergoing any other change than that which produces monstrosities, organisms are thus successively and insensibly altered by almost imperceptible modifications, until in the course of ages nothing remains to them that was originally specific, and, by parity of reasoning, nothing that was generic, or tribal, or ordinal, or pertaining to classes. Thus, when it is once admitted that modification may take place in any organ or part essential in specific life, there is no limit to what may take place under the supposed operation of physical influences. All closely allied forms cease to be the objects of special design; special creation itself becomes problematical, since under this view, the primitive germs themselves may have

originated from the accidental combinations of inorganic matter. But the physiological truth of the question, lies in the incapability of germ-cells to vary from their specific plan of ultimate development. And although the ovum has formed an integral part of an antecedent form, the structural evolution of a perfect being from it, or the germinal capacity of the ovum, does not represent the parent or organism producing it, but its *species* and at the same time its genus, family, order and class.

There remains still another element of disorder to be taken into consideration, which results in the production of a variety known as the *hybrid*.*

The entire question of hybridity stands in need of a careful re-examination. Conclusions have been promulgated and received as the general laws upon this subject, and are usually regarded as decisive, although I cannot conceive why its investigation should be looked upon as exhausted. Probably no other portion of natural history affords opportunities so convenient to pursue this study as Entomology, and I hope some student will follow it in the proper philosophic spirit.

The variety resulting from hybridity is generally regarded as transient, displaying the specific characteristics of both parents; as incapable of continuing itself with one of its own kind, but fertile with the parent stock and of course reverting to it. Whether it is possible to establish a *permanent variety*, either by the intermixture of a hybrid and a species closely allied to the parent stock or by any other means, is an interesting but undetermined question in Entomology. Dr. Hagen of Germany has recently displayed much interest in this subject, but has not investigated it experimentally, so far as I am informed. The few cases of hybridity that have been recorded have taken place in nature, or have been the result of mere individual caprice on the part of experimentalists, and without reference to the determination of any of the numerous questions to which it gives rise. Hence, hybridity can be noticed here only as a cause of variation in Insects, and how far it may have complicated, or may be capable of complicating the determination of species from the characters of the perfect being, must be left to future investigation.

Since the above was written, my friend Dr. John L. Le Conte, of Philadelphia, has suggested an important consideration, which should not be forgotten by those who may attempt to investigate this subject. If hybridity is capable of giving rise to a *permanent variety*, or seriously complicating the determination of species, *such intermixture has most probably already taken place, in species of the same geographical distribution, to a degree that has exhausted the capability of further intermixture*. For it seems most improbable to suppose, that species capable of producing permanent inter-

*The Entomologist Weekly Intelligencer, London, 1857, No. 50, p. 188; No. 51, p. 197; No. 60, p. 62. The same 1858, No. 81, p. 22; No. 94, p. 127; No. 88, p. 77, with the letter of Mr. House.—*Stettin, Ent. Zeitung*, 1858.

mediate forms by crossing, could be associated together for indefinite periods of time in the same area, and not have had the tendency called into activity long since, by the production of permanent hybrids, now indistinguishable and registered as true species. Hence, if there be anything of truth in a supposition so probable, it is easy to perceive why the hybrid is incapable of propagating with its own kind, and why in mixing with the parent stock there is a constant tendency to revert to it. To arrive at any satisfactory solution of the question, however, it will be necessary to determine the effect of the intermixture of closely allied but distinct species from widely separated countries.

In order to make the foregoing ideas respecting species as clear and definite as possible, it may be well, perhaps, to throw them into the form of a definition. It may be regarded, therefore, *as a specific cycle of organic and instinctive actions, manifested in the production of representative forms and in their biographies, having reference chiefly to the continuance of special forms, these being unchangeable and immutable in all their essential characters, but variable in size and color.*

Species then, has an ideal existence in nature, and its representatives or the individual in some of its forms, is that which falls under observation and with which the naturalist deals in his generalizations. The description of species should be a biography, and should present everything in the life of the group. It should commence with the egg and give its form, markings and color; its relations to the food plant; the means adopted for its security or protection.

The young larva on emerging from the egg should be described, with its ornamentation and external structure or appearance; its metamorphoses or moltings, and the successive changes produced in ornamentation and structure should be noted, until it reaches the condition characteristic of maturity; its habits, instincts and mode of association with beings of its own kind observed; its natural enemies and means of defense, concealments or mode of self-protection ascertained; its diseases described; the nature of its sustenance determined; the physical conditions under which it lives and its geographical range established.

Its mode of preparing for pupation should be recorded, and whether the metamorphosis is immediate or delayed, and during what portion of the year it takes place; the pupa, its form and structure, should be described, and how the imago escapes from the pupa case and cocoon.

With the perfect insect should be given the number of broods during the year, and the intervals of time during which the individuals of the brood appear, and the months in which the imago may be met with; its individual peculiarities of structure, and the ornamentation of the normal form with the chief variations to which it is liable.

The determination of true species from the imago, is by no means simple or easy:

but when individuals agree in all these particulars, when their biographies and structure impress the mind with the idea of identity, there can be no longer any doubt that they are representatives of one and the same conception, even though the perfect forms may differ materially in ornamentation.

GENUS.

We find in nature various groups of species, the chief conception involved in each of which, differing from the details of any specific group selected as a type, and which are brought together naturally into a secondary group, by the general harmony or agreement existing in their biographies and structural peculiarities. Each specific cycle possesses some special characteristics by which it is distinctively marked, by which we recognize in the representatives permanent and individual differences, irreconcilable with the idea of identity, whilst at the same time, there is an obvious tendency to specific resemblance, giving rise to ideas of similarity with specific differences. Thus, we may have several specific groups, or there may be but a single group, which agree amongst themselves in general and ultimate structure and in biography, more intimately than with any other natural bodies or species, seeming to be harmonious and conformable variations of a dominant thought or conception which pervades the whole, not only in their structural evolution and history, but as perfect beings. In this secondary or generic group, the conception is then one of *conformity*, by which distinct natural bodies or specific cycles are intimately related to each other, linked like the harmonic combinations or chords of which any musical note taken as a basis is susceptible. From their evident concurrence, but not identity, in all that, of which species consists, the mind is naturally led to group them as similar but distinct bodies, and perceives the relation of conformity in the sum of the organic actions from which the individuals result, and which aim at maintaining the integrity and continuance of the races.

The affinities existing within the limits of single groups, when these consist of more than one species, are therefore very intimate although of dissimilar values or intensities. For, whilst the species are conformed to some dominant conception, their affinities branch out into other generic groups, producing a concatenation of relationships throughout the entire range of a family, or extending into other families. These are most observable, perhaps, in some portion of embryonic life, but are present also in the perfect being itself. With the exception of these almost insensibly formed relationships, necessarily existing from the fact that each individual is the bearer of its generic and family characters, as well as of its specific or individual ones, form is the same among all the individuals of a genus, both in the embryonic and perfect condition. In all the essential organs there is the closest agreement, if not absolute similarity in the peculiarities of ultimate structure, both the internal and external.

We perceive here, why and how the characters of a genus should flow from it, and not be created by them or rather made dependent on them. When we possess all the conformable ideas included in the several specific creations which may constitute it, we have a series of special modifications of some dominant conception, carried out in a variety of conformable modes throughout entire specific cycles, and indicative of special relationships to external conditions and the necessities of individual existence. Generic characters should therefore be found in specific biographies, in instincts and habits, in the embryo and the course of its development, as well as in the parts of the mature being, since the conception exists in nature precisely as does that of species. The genus is neither more ideal, nor more real than the species; the latter consists of a single specific conception, whilst the former is usually, but not necessarily, composed of many such conceptions.

It is particularly difficult to indicate the limits of a genus. To determine it, entire specific histories must be compared, and a rigid comparison instituted between the ultimate structural peculiarities, of some of the parts, of the perfect beings. For, within the limits of a family, or many genera differing amongst themselves simply in degrees of relationship, if we regard the mature being alone, we find that form is the same, that there is no difference in the degree of complication of structure amongst the several secondary groups, but simply in the details of the development of parts essential to existence, or at least intimately connected with the internal organization. When generic separation of species becomes necessary, specific conformity in some part of their cycles, or in these portions of ultimate structure, becomes aberrant to a degree that is suggestive of divergence. Sometimes this disagreement is most apparent in the embryo, or in the course of its metamorphosis; or is most developed in the imago, or in all these states united. Wherever it may occur in the specific cycle, it is always expressed in some part of the perfect being, but by no means in the same part of the structure of the different groups. Even in the same group, individual variations or disagreements in particular organs take place, but the general conformity to the dominant conception involved in such individuals, is too observable to authorize separation, and hence they are indicated as distinct groups within the generic cycle. Hence it is, that no special organ, or part of structure can be assumed as the basis of generic separation of individuals, in any of their states; for, it is by this individual latitude and variation, that the chain of relationships within families, and even beyond them, is maintained in organic beings.

Practically, however, the systematist must classify natural bodies chiefly from a knowledge of them in their perfect states, for in this condition they fall under observation most commonly, and are most readily studied. Systemization on this basis is the first step in the study of every local fauna, and it is upon this, that its subsequent evolution and the study of specific histories must be placed. It is necessary,

therefore, to determine, as well as we may be able, in what a generic diagnosis of the perfect individual should consist, and to point out in general terms, the organs and parts in which the indications of generic differences may be looked for. It is, perhaps, scarcely necessary to repeat, that these will not be found expressed to the same degree, in all the organs at the same time in the various groups, and that the special variations must be valued according to the agreements or differences in general structure. We would look for generic characters then, in the development of the head and its relations to the thorax, and in the agreements of the various parts of the body with each other; in the accessory cephalic organs, the eyes, the ultimate peculiarities of the antennæ; in the characteristics of the oral apparatus, the labial palpi, the rudimental or developed condition of the internal and external maxillary palpi, and as intimately connected with these and the digestive system, the development of the tongue; in the peculiarities of the wings and a general similitude of ornamentation. Inasmuch, however, as the latter is liable to specific variability, its value is purely secondary, although a tendency to the repetition or reproduction of ornamental forms, may be constantly observed in most well marked groups. It is but rarely introduced into the generic diagnosis, for this should be readily recognized by those characters which are indicative of physiological structure. It may afford hints as to generic affinities, but should be disregarded when the more permanent portions of structure are divergent, or when these are correspondent and the ornamentation but slightly different.

In connection with the generic group, it may be proper to remark, that it is well known the genera of the early writers are in a great measure recognized as families at the present day. They depended chiefly on the various antennal forms for the establishment of these groups, and I would here call attention simply to the correspondence between general antennal forms, and the general pterogostic structure of the wings. Besides this, there is the fact, that the distinctive form of the antennæ belongs to the imago period; that, *their development and that of the wings are contemporaneous events*, the former taking their peculiar structure only with the addition or acquisition of the organs of flight. The antennæ, however, frequently undergo modification which is not expressed in the wings, and the structure of these on the other hand, vary from a typical pattern, in many instances, without the variation being markedly shown in the antennal organs. In the group at present under consideration, there is absolutely no generic modification of the pterogostic structure, in any member of the entire family that has come under my observation. But, the antennæ, on the contrary, undergo changes in ultimate structure, the most aberrant species in this respect being found in the genus *Smerinthus*. The attempt to find generic characters in the separation or approximation of the branches of the median vein or nervure, is *essentially artificial*; for special investigation proves, that in this

respect, they are subject to marked variations in the individuals of the best characterized genera of the group. In consequence of this conviction, I have not described this portion of the structure of the perfect insect in my own diagnoses, preferring rather to assign to it another and truer value. At the same time, I am well aware, that in other groups, in common with all parts of structure, it undergoes changes which are significant and valuable guides to the student. In the papers which may succeed the present one, these variations will be duly delineated and described, as they may occur in the various families. But, the valuation which will be presently assigned to this structural part, is intended to be a general one, which will apply to all families of the division Heterocera.

I hope the student will find the treatment of this group sufficiently lucid to give him a clear conception of it. It was not possible to confine its consideration to a single group, or to avoid the introduction of the individual, but this I trust has not given rise to want of perspicuity. I will candidly acknowledge, that I have found the communication of my own understanding of the nature of the group, a subject of no slight difficulty, and whether I have been successful in the endeavor, the student must determine for himself.—The recognition of generic differences in the perfect being, is usually regarded as a happy endowment, or matter of individual tact, especially distinguishing a few fortunately constituted minds. I should rather characterize it as the consequence of the observance of fixed principles founded in nature, and the habit of duly valuing differences in ultimate structure. We will conclude the consideration of the group with the attempt to define the Genus as, *a group of specific forms, deviating from all others of the same family, or an expression of conformity in the specific cycles of distinct species, and indicated in the individual by the peculiarities of the ultimate structure of some of its parts.*

FAMILY.

During the process of classification it is found, that assemblages of generic groups naturally form a third and more extensive one. For, as has been observed heretofore, the limits of genera are not abrupt usually, but shade into each other, retaining those characteristics of form which result from internal organization and structure, but deviating in the ultimate structure of some of their parts. Form, indeed, is the expression of structure, and though modified in its details, the fundamental idea of which the genus is a special group, is retained so as to be recognizable, and we perceive in the individuals of various genera a resemblance to each other, not only in shape, but in those parts of structure which go to determine shape. And this is not only observable in the perfect state, but is perhaps most significantly shown in the embryo, in consequence of the simplicity of their figures. In the perfect insect, this idea of

resemblance pervades the details of structure, whilst it is characterized by a multitude of ultimate peculiarities; and it is to the general resemblance of structure, as well as to a distinct pattern of form, that we should look for that which distinguishes the family. This may be a very comprehensive conception, the genera composing which are a series of special modifications, carried out in a variety of modes, having similitude of external form for its basis.

It is, however, difficult to convey a conception of form by means of words alone, and it is important to substitute some portion of structure easily described and recognized, and which is always found to be associated with the essential conception of family. The agreement existing between general antennal forms and the structure of the wings, has already been alluded to, and I am about to make an application of the fact to which perchance objections will be made, in consequence of the changes it may produce in the number of families included in the section to which the present one belongs. Recent classification has greatly multiplied the number of these family groups, and it is with reluctance and self-distrust, that I find myself compelled to propose a character that will necessitate retrogression. The conclusion to which the study of pterology has brought me, are the results of independent investigation, commenced at a time when I was not aware it had been introduced into modern classification, and I have been unable to find that it has received at the hands of any systematist, the interpretation which will be given to it. The American student occupies, perhaps, a position too isolated to propose an innovation; it is not, however, offered with this view, nor with the expectation that it will change systems already established, where lepidopterology has been for many generations a favorite study, but to present to the students of my own country, where it is still inceptive, what I believe to be founded in nature, and what has furnished me with an easily acquired key, that opens the mysterious door of natural affinities in the perfect insect.

Investigation confirms, that in any given species the neuration of the wings, or the pterogostic characters, are *invariably identical* in all the individuals of the species, throughout its entire geographical range. There may be, it is true, what might be called individual monstrosities, but they are of extremely rare occurrence, and consist simply of an approximation of the origin of branches, or unnatural inosculation which are so unimportant, that they never change the specific type, and can never mislead when the observer has more than one specimen at command. This specific wing structure may characterize all the individuals of a family, or it may undergo conformable variation in the various genera of a family, the conditions regulating which I have been unable to generalize. But, in this case, it is nearly always accompanied by variation in the ultimate peculiarities of antennal structure, whilst the type in the *posterior wings is essentially unchanged, whatever may be the variation in the anterior*. Now, the wings are one of the most important parts of structure, which go to deter-

mine form or resemblance in lepidoptera, and as there exists in them a typical structure, which enables us to bring together in a group, the individuals whose characteristics accord perfectly with the conception of a family, we need not look further than this, and the agreement in general structure, to determine easily, and naturally, the existence of this relationship between perfect individuals.

PTEROLOGY.

This leads naturally to the consideration of this subject, and the special characters of the wings in the present group. The treatment of it must, however, be brief and concise, else these preliminary remarks will far exceed the limits originally marked out.

The mode of escape of the imago from the pupa case, and the protections with which it is frequently provided, has been a fruitful source of conjecture and supposition amongst naturalists. It is not necessary to notice these in detail, further than to observe, that not one of them furnish a rational or probable explanation of the process as it occurs in the imago, whose transformation is subterranean. The escape of the perfect insect from the cocoon takes place in two ways; in one, the pupa case is first thrust forth by the bending and extension of the the abdominal segments, and the case subsequently ruptured along the dorsum by the action of the *thoracic muscles* of the contained insect; in the other, the pupa case remains within the cocoon, and the insect makes its way through the substance, at a point predetermined by the larva in its construction. In this latter case, the act of insect parturition takes place in the following manner. The imago enveloped in a cocoon, escapes from the pupa case in the usual mode. In obedience to an essential, instinctive prompting, the larva, during its final metamorphosis, places its head in the direction and opposite to the avenue of intended escape, after its work has been completed, whether this be the construction of a subterranean cell or a silken cocoon; and as soon as the escape from the pupa case is effected, the liberated imago engages itself in this avenue, using the portion of the thorax to which the wings are attached, or the *wing-shoulders*—not the *tegulæ*—as fixed points, on which the thoracic muscles operate to effect the perfect delivery of the body. The motions of which the thorax is susceptible are of two kinds. The one is lateral expansion, by which dilatation of the avenue is effected, and the resisting structures ruptured; and the other, is an extrusive impulse which takes place after this has been effected, and during which, the wing-shoulders are thrown forward to give fixed points of support or operation, from which the prothorax is impelled against the resisting portions. In those species which construct dense silken cocoons, there is an abundant secretion poured forth from the salivary vessels during the delivery, and this has possibly some solvent power over the gum which unites the threads, but none whatever on the threads themselves.

The legs too, are passive during the process, and are folded on the thorax; at least this applies to the anterior, but the posterior pair may aid the extruding efforts of the thorax, particularly in those species whose transformation is subterranean, and this is probably one of the principal objects of the tibial spurs. The wings are thrown over the back, and the force of the efforts falling chiefly on the under surface of the base of their attachment, the principal veins will always be found denuded. The action of the thoracic muscles is so powerful and effectual, that a few moments suffice to complete the process of insect parturition. After the extraction of the thorax, the feet are called into play to aid in the delivery of the abdomen, which is extracted chiefly by means of a curious vermicular motion.

After parturition has been effected, the dilatation and expansion of the wings themselves take place, and during which there is a positive increase in size, or a gradual extension of their structure. At this period an excised wing is very easily dissected; or the same thing can be accomplished in the dried wing after prolonged maceration in water, to which a very small quantity of hydrochloric acid has been added. Thus we ascertain, that the wing consists of two distinct portions, which are capable of being separated from each other. One of these consists of an extremely delicate double membrane, one on the upper and one on the lower surface, and which are indeed essentially the same, being continuous at their edges, spread over a system of prolongations of the chitinic substance of the external skeleton, assuming here the form of tubes. These constitute the *neururation of the wings*, or the pterogostic structure which fulfils two purposes. In the first place, they confer the necessary lightness on the wings, and at the same time the strength to resist vibrations on the atmosphere, and also protect the ramifications of the tracheal system. These chitinic tubes also afford channels, in which the early circulation of the nutritive fluids or blood, is conducted through the wings during their expansion; for, at this period it is very active, but almost entirely disappears subsequently, especially in those whose lives are short. This circulating fluid, at this time, is true blood, containing a large number of black granules, although perfectly homogeneous at first, and forms a decided clot.

The rudiments of these tubes may be traced in the forming wings in the larva, just previous to transformation, by the distribution of the principal tracheal trunks of these forming organs, and still more distinctly in the pupa. No nutritive process takes place in the wings, in all probability, after they have attained their full development, and have hardened, and the terminal ends of the tubes being open, just sufficient circulation is maintained in them to confer the necessary degree of pliancy. In the act of wing expansion, these tubes undergo a positive elongation, and a separation of the branches takes place, so that the membranes of the wing are stretched, not only longitudinally, but transversely. From this fact, and because if one-half the

wing is excised immediately on the escape of the imago from the cocoon, the remaining portion is duly developed, and never witnessing the escape of air bubbles from the cut extremities of the veins in the insect particularly observed, (*Samia Cecropia*,) I was disposed to conclude, expansion did not take place in obedience to a voluntary effort of the imago, but in consequence of some inherent property in the veins themselves. Subsequent dissection, however, revealed to me the existence of numerous transverse septa or partitions, in the principal tracheal trunks of the wing of this insect, extending from the base to the origins of all the branches, and consisting of the same tissue as the tracheæ themselves, which sufficiently explaining the cause of the non-appearance of air bubbles, led me to retract my conclusion. The presence of these septa is a very curious fact. They are extremely delicate, are attached to the entire interior circumference of the tracheal trunk, and their presence difficult to demonstrate, but I think the trunks of the wings in the species of the present family, and those of the diurnal lepidoptera, are not provided with them, at least I have never been able to find them, and excision of the wing in members of this family might be accompanied by more positive evidence of voluntary effort, if the wings are really expanded by the respiratory efforts of the imago. If this be true, every endeavor to force air into the tracheæ, would be indicated at the cut extremities of the veins, by disturbing the globule of fluid which collects there.

Early in my studies on this subject, I was led to give specific names to the various branches of the principal trunks, indicating to a certain extent their origins and distributions. I still regard it as preferable to the system in use amongst European entomologists, and I shall retain them here, and give the names of the various trunks and branches. The *marginal nervure* (1, Fig. 1, 2,) forms the anterior edge of the wing, and is followed by the *costal nervure* (2, *b''*); beneath and parallel to this again is the *subcostal nervure* (3), and in this is found to occur most of the changes in the neururation of the anterior wing. It subdivides into several ramifications or branches; those which are distributed to the costa or anterior margin of the wing being the *subcosto-marginal nervules* (*a'*, *a'*); the one terminating in the tip of the wing, the *subcosto-apical nervule* (*b*); that immediately beneath it the *subcosto post-apical* (*c'*), and the last branch the *subcosto-inferior* (*c''*). At the origin of this branch arises a short transverse vein, called the *discal nervure* (*d*); it is a communicating branch between the subcostal and the one beneath it, and gives rise at about its centre to the *disco-central nervule* (*c d*), called also by Guenée, the *independent*. The next principal trunk is the *median nervure* (4), which subdivides first at the point of anastomosis with the discal into the *medio-superior nervule* (*m s*), followed by the *medio-central* (*m c*), and *medio-posterior* (*m p*). The last nervure is the *submedian* (*s m*), sometimes simple, sometimes bifid at the base. In the posterior wings of the Sphingidæ, in addition to the foregoing, there is the *internal nervure* (*i*), and a short communicating

branch between the costal and submedian nervures, the *intercostal nervule* (*i c*). The posterior wings are unprovided with a marginal nervure; the *bristle* on the edge of the anterior margin at the base, is regarded as a modification of it. Any modification, or additional nervules, found in the wings of individuals of other families, are easily indicated in the same manner as the foregoing. The European systematists name the branches of the subcostal nervure (*see fig. 1*), commencing at the tip of the wing, the *first*, *second* and *third* superior nervules; and those of the median, the *first*, *second*, *third* and *fourth* inferior nervules or veins. The space bounded by the subcostal, median and discal nervures, is the *discoïdal* cell, or simply *the disc*. For purposes of accurate specific description, I have likewise named the spaces between the nervules as follows: (*Fig. 1, 1' to 8'*) the *apical interspace*, *post-apical*, *subcosto-inferior*, *medio superior*, *central* and *posterior*, the *submedian* and *internal*. These terms will be found useful in indicating the exact situation of markings on the wing.

ORAL APPARATUS.

The differences in the oral organs, during the embryonic and perfect states of lepidoptera are so marked, that it will be preferable to study them first in the larval condition, and then trace the changes which have taken place at maturity. They are especially interesting in showing the modifications introduced in the same organs of an individual, to adapt the apparatus to special modes of existence. In the larva this apparatus is manducatory, and the development of the several parts of which it consists, has special reference to the necessities of larval life. Although a mere embryo, the larva sustains an independent existence, and must rely on its individual exertions for the maintenance of its life, and defense against its enemies. Its entire energies, are devoted to the assimilation of immense quantities of nutriment to supply the material of organic changes; it is, indeed, *an eating machine*, the assimilative and digestive system being greatly in preponderance. Its special senses and instinctive endowments have, beyond doubt, marked relations to the dominant necessity of embryonic existence. The former may well be much more restricted or less developed than in the imago, whilst at the same time it would be unphilosophical to suppose, there could be any material difference in the function of the same parts or organs in the two states, however different may be their appearance. All the parts of the embryonic mouth are represented in the imago, but with reference to new conditions of life and in dissimilar proportions. With the addition or assumption of wings, and the complete evolution of the reproductive system, the principal objects connected with life are the propagation of species, and the selection of the appropriate food plants of the young. It will not be maintained, I think, that this latter act is the result of mere instinct independent of sensory endowment; that the imago is attracted to the

flower simply by its color; that it can traverse fields and regions in the night time where the most varied vegetation is intermixed, and select the appropriate food plant of its young with the certainty of an educated botanist, without the aid of some special sense. And it is plain too, that the determination of the food plant, is not arrived at in the two states in the same manner. The larva never rejects a substituted food until it has first tasted it, and the imago has no organs of manducation with which to determine the food plant by the sense of taste. The selection is the result of the action of different senses, perhaps more developed in one of its states than in the other. It would not be hazarding too much to say, that in consequence of being invariably placed in the midst of its appropriate nourishment, and but rarely compelled from accidental causes to seek it, we would expect to find the sense of taste specially developed in the larval state; and from the acts of selection by the imago, we should look in it for that of smell as well as taste, as important sensorial endowments. Whilst this may be admitted in general, the specification of the organs devoted to specific functions, will doubtless be objected to, and I am well aware that a subject so interesting physiologically should be approached cautiously. However, in describing the accessory organs of the head, the question of their functions naturally arises, and when this is not immediately obvious, it should be an object with every student to endeavor to ascertain them, both by microscopic examinations and dissections, and by experimental observation. I regret my own efforts towards this end have been too few and too recent to justify, perhaps, positive inductions, but such as they are, they will be given in the hope that others may be induced to pursue the subject.

The most noticeable organs belonging to the head of caterpillars are two corneous, strong, central, horizontally-acting *mandibles*, or upper jaws, which meet each other on the median line of the body. These are the only instruments of manducation of the mouth, and their opposite faces form surfaces almost smooth, or present cavities and irregularly arranged ridges; or they are thin, and overlap each other, and are furnished with serrated or toothed edges adapted for cutting or gnawing. These are the only forms I have observed in the larva. These organs are covered superiorly on their upper surface by the

Labrum or upper lip. This is attached to the lower edge of a triangular or lance-shaped piece, placed in the lower portion of the median suture of the head, and may be called the *clipeus*. The labrum consequently is placed in the centre of the head, overhanging the mandibles, and is in contact with them. The upper portion is membranous, and the lower consists of a subcorneous plate, at least externally, which is excised or deeply emarginate centrally, and therefore presenting an obtusely rounded lobe on each side of the median line. This subcorneous portion is capable of being retracted and depressed by two bundles of muscles with long tendons, which are

attached to its upper and outer angles. The function of the labrum is to close the space between the mandibles above, and to prevent the food from escaping in that direction. At the external base of the mandibles are found the

Antennæ. These consist of a soft conical base, capable of being retracted or dilated, having on its summit a short, cylindrical stalk consisting of two articles. The stalk does not vary in form, nor in the number of its articles, throughout the entire order, whatever may be the differences in the imago; and the last article is furnished at its summit with a long and slender seta. When disturbed, the larva can retract them so as to conceal the organs almost entirely within the conical base; but on resuming motion they are first exerted, and during the act of feeding, although thrown outward with every extension of the mandibles, they nevertheless lightly palpate the leaf with their long setæ. The ordinary use to which they are applied seems to be that of simple palpation, and there is nothing in their ordinary employment, their position or structure, as far as I have ever been able to determine, which justifies the view that in the larval state they are the seat of any special sense.

The middle and under portion of the head is marked by the absence of the walls of the cranium, and is filled up by several parts which should be examined beneath a lens to be easily distinguished. This portion, it will be perceived, can be naturally divided into a central and two lateral parts. These lateral portions are what are known as

The Maxillary palpi. These organs lie along the inferior faces of the mandibles on each side, and consist of three very distinct joints or articles, mounted on a large soft base, which is indistinctly divided into two portions, and extends backward nearly to the articulation of the head with the body. On the internal face of the second joint will be found an additional tubercle, or mammiiform body, ordinarily concealed from view. This tubercle is the *internal maxillary palpus*, whilst the exterior articles previously referred to, are the *external maxillary palpus*. These two sets of palpi are merged into one stalk, and very much resemble in appearance an additional pair of feet. The state of their development in the larva, as compared with their condition and appearance in the head of the imago is very remarkable, and appears to indicate a specialty of function in the embryo no longer required in the perfect being, in which, except in some of the micro-lepidoptera, they are represented by mere corneous rudiments, so unlike their former condition, that it is difficult at first to believe them identical. In the absence of any experimental observation directed to the determination of this special function, I can only say that in feeding, the extremities of the external pair are closely applied to the leaf, and appear to grasp it. Whether they have a more special function than that involved in touch, must be ascertained hereafter. Between the lateral enlargement, forming the bases of the maxillary palpi, is a soft central portion, the most posterior part of

which likewise extends nearly to the articulation of the head with the body. This may probably be called the *mentum*, or chin, and articulates anteriorly with the

Labium, or lower lip. This lies usually in a depression or pocket, at the point of articulation with the *mentum*, and from which it can be thrust outward, so as to be in advance even of the mandibles, especially in the spinners. It is a small, fleshy, cushion-like lobe, having next its articulation with the *mentum* a corneous half circle, which tapers within the head into slender processes on each side, and to which are attached numerous sets of small muscles. In the middle of this movable lobe will be found the *spinneret*, or a little tube, in which terminate the silk vessels, and from which the silk liquid issues in the process of spinning. At each side of the base of this tube, and almost in contact with it, are two minute, generally cylindrical, jointed palpi, each terminating in a seta. These are the pair of

Labial palpi, which sometimes attain such an excessive development in the imago. In the spinners these organs are quite distinct, but in *Ceratomia quadricornis* the spinneret is surrounded by a collection of fimbriæ which quite conceals it; and the labial palpi, which are applied against its sides, are also fimbriated at their extremities. These might more properly, perhaps, be called filiform papillæ, for they are fleshy and soft, and unprovided with an investing tunic of corneous substance. The minuteness of the labial palpi in the caterpillar is quite worthy of observation; and their position, with reference to the spinneret, seems to connect their function in the embryo, with the uses to which this latter instrument is applied. Whether the structure of the organs of the labium, in larvæ that do not spin, is similar to that of *C. quadricornis*, I am unable to say; but, in all the spinners I have examined, the palpi are cylindrical and distinct. The labium is situated just beneath the inferior point of contact of the mandibles, and is separated by a transverse sulcus from another lobe, the greater portion of which lies within the mouth, and forms its lower surface. This is the analogue of the *inferior maxillæ* or lower jaws, in the mandibulated orders, but in this I think it undoubtedly corresponds in function to the

Tongue. It extends within the mouth to the commencement of the pharynx, and is very distinctly divided by a sulcus in the median line. When viewed as a transparent object, or even in place with a half inch lense, it is found to be covered with minute fleshy papillæ, which are also distributed over the portion exterior to the mandibles. The superior part of the labium, however, is perfectly smooth, and presents no evidence of papillæ. From the structure, position and use of this organ, I judge it is endowed with the *function of taste*, and I cannot regard the fact as wonderful or surprising, that it should be developed in the perfect insect, into an organ obviously possessing the same function, and modified in form and physical appearance agreeably to the requirements of a new existence.

This organ in the perfect insect, (*see figs. 3, 4, st.*.) also called *spiral maxillæ*, *antlia*,

spiritrompe, proboscis, is a long, cylindrical transversely ribbed tube, consisting of two symmetrical parts joined together by means of the serration of their edges, thus forming a central canal. Each of these filiform portions contains also a canal in the interior, which is a continuation of the oesophagus, so that the spiral tongue is furnished with two separated, suctorial tubes. Hence, at the base of the tongue the oesophagus is furcate, but subsequently a single tube is formed, the partition at the commencement soon disappearing, and is continued thus to the stomach. The central canal formed by the union of the two filaments has no suctorial function, but the salivary vessels open into it at the base and discharge in it their secretion. The oesophageal canals of the filaments, are placed in the midst of what I believe muscular tissue, but I was unable to detect transverse striations in it under a power of 400 diameters. This tissue, which nearly fills the interior of the filaments, appears to consist of two principal bands, one of which is attached to the upper, and the other to the under surface of the interior, and regulate the extension and coiling of the filaments, although this latter action is due mainly to the peculiar construction of the corneous tube. The canal itself terminates in the bulb of the filament at an external orifice, which I think I have seen distinctly in the bulb of the tongue of *Macrosila quinquemaculata*. In this insect the bulb is corneous exteriorly; but on the interior surface it is very apparent, and is covered by an extremely delicate coat, having a few scattered papillæ, and is filled—at least in the dried specimen softened by maceration—with a colorless gelatinous substance in which I failed to recognize any characteristic appearance. In *Spilosoma acraea*, the filaments contain much less chitine than those of the Sphinges, and the tongue makes a very good object for microscopic examination without dissection. The filaments, however, have no terminal bulb, but are flattened and very abundantly supplied with papillæ on their inferior face. Next the central canal within each filament, is found the spiral trachea. It is naked as it is usually seen in the body, but is provided with an investing tunic (*M. 5-maculata*), and gives off numerous branches from its outer side to the tissues surrounding the suctorial canal, diminishing in size toward the bulb until it becomes impossible to follow it, and ascertain how it is there distributed. It has no relation whatever to the act of suction. This is performed by the sucking stomach, which lies almost connected with the true stomach on the tract of the oesophagus, and by its expansion the nectarous juices of flowers are pumped up through the suctorial canals. The function of taste, I think beyond doubt, resides in the extremity of the filaments. This is indicated not only by its structure, but we would expect from analogy to find it there.

At each side of the base of the tongue will be found a corneous process (*fig. 3, mx. p.*) which is the *external maxillary palpus*, and the representative of the organ we saw in a condition of high development in the larva. The *internal maxillary*

palpi, are placed on the inner base of the filaments, one of which may be seen figured in the detached portion of a filament in *fig. 3*. These latter organs are sometimes well developed, and from three to five-jointed in other families, but their origin is always at the inner base of the tongue. In the middle of the head, and overhanging the exterior base of the tongue (*fig. 3, l.*) is a minute plate or immovable scale, which corresponds to the *labrum* or upper lip; and the *mandibles* or upper jaws are the most exterior corneous processes, (*max.*) now fixed and useless. The *labial palpi*, however, which we found in a mere rudimental state in the larva, become very noticeable organs in the imago. They are not delineated in any of the figures, having been removed to show parts less developed, but the points of their attachment are seen in *fig. 4, p.* where there are two holes or foramina. They are never more than 3-jointed, and the articulations are more or less completely concealed by a covering of scales or hairy scales. They serve principally to deepen the cavity for the reception of the coiled tongue, but their real function is doubtless not confined to a use so purely physical, for throughout the order there does not appear to be any relative development in the two organs. I have never attempted to dissect these organs, and their internal structure might throw some light on the nature of their functions. The concurrent development of these organs and the tongue in the imago, whilst those parts which predominate in the larva are usually so completely atrophied, seems to point to a higher functional condition of the parts in the imago than the embryo.

These are all the parts of the oral apparatus in the embryo and imago, but in addition, I wish simply to direct attention to the existence of a foramen at the base of the remains of the mandibles (*fig. 3, f.*) and sometimes placed somewhat higher on the front. It is noticeable only when the head has been denuded of scales, and in many instances is quite large and elliptical, and is especially observable in the *Saturniidae*, in *Cossus*, besides most members of the present group. A portion of a split bristle with a fine point, can easily be introduced through this foramen into the head. When this is sought for by dissection it is found between two corneous plates; and during a single examination of this kind, I found here quite a large tracheal trunk, which I think originated at this external opening. I would not assert this by any means positively, for I ruptured it unfortunately before I could certainly ascertain the fact, and have not since repeated the dissection. If this be true, however, we have here a pair of *cephalic stigmata*, and the question arises whether their function is a special one, or similar to the stigmata in other portions of the body. I have been too much engaged in other studies, since first making this observation, to enable me to elucidate fully this portion of insect structure; but my own supposition is that it is connected with, or forms the seat of the *function of smell*. There is not the least trace of this opening in the head of the larva, and as it has not heretofore

been noticed by entomological anatomists, I regret my inability to solve at present the question of the function connected with it.

Antennæ. We have still to consider these organs in the perfect insect. As has been mentioned heretofore, they are quite invariable in structure in the embryo, but in the imago their variations and differences are exceedingly numerous. In the latter state these organs consist of a bulb, and a stalk composed of many articulated joints, and furnished with a variety of accessory appendages, amongst the various members of the order. Within the head, the entire circumference of the bulb serves as the point of attachment to numerous delicate muscles, but they are never extended into the bulb itself. If there is any muscular tissue whatever, either within the bulb or the antennal stalk, I have failed to ascertain the fact, or to recognize the tissue beneath the microscope. The stalk is occupied chiefly, if not entirely, by a tracheal trunk, and what, in the recent specimen, is a soft, pulpy, granular substance that freely escapes under pressure. This, beyond doubt, is nerve tissue, and from it is sent a distinct branch, or rather a sheath, accompanied by a branch from the spiral trachea to each pectination on the antennæ of *Samia Cecropia*. These pectinations of the stalk are furnished densely with tubular, delicate cilia, on the inner surface of which, doubtless, both the nerve and tracheal filaments ultimately ramify. This fact, however, I have been unable to demonstrate by actual dissection, because of the difficulty involved in the management of such minute isolated and opaque parts; but I regard it as none the less certain. As sensation according to a general law, manifests itself in the ultimate ramifications of nerve tissue, the cilia of the antennæ must be regarded as the sensitive surface of this instrument.

The antennæ in other orders I have examined, do not differ materially in structure from that of lepidoptera. In the *Ichneumonidæ* we find an apparently simple stalk externally, but it is really abundantly furnished with short, delicate, tubular hairs, that open on the interior of the stalk by perfectly distinct orifices. Interiorly it contains an apparently simple sheath of granular nerve tissue, a tracheal trunk and no muscular tissue. Although in the rude process of disruption with the finest needles, no processes from the nerve sheath to these delicate tubular hairs can be detected, is it to be supposed that their interior is therefore unoccupied by them, and that they are simply filled by the circulating fluids? Notwithstanding this similarity of structure, I do not think the function of the instrument is *identical* in the two orders. It is, however, similar, and is an illustration of the ways and means by which one function is carried out in different orders.

Function cannot be determined from observation on structure alone. Experimental observation must be united with it in order to obtain facts for our guidance.

Every entomologist must be familiar with the fact, that when a moth singes its antennæ in a flame, it is more or less incapable of directing its flight, and usually spins

in circles on the surface with which it may come in contact, with its head downwards. For a long while I supposed this was a mere expression of pain, until I experimented in various ways with this instrument, for the purpose of ascertaining its function.

My first experiments consisted in the excision of the antennæ, immediately above the bulb, in the male *Samia Cecropia*, as soon as it had escaped from the cocoon, and before expansion of the wings had begun. The circulating fluids exuded, and soon formed over the cut surface, a clot by which it was permanently closed. There was no escape of air from the severed tracheal trunk, nor any indications of respiratory effort on the part of the IMAGO, neither was the globule of fluid taken up through the tracheal trunk. The mutilation gives rise to very little expression of pain, after the first shock of the operation, and the imago fixes itself as usual to expand its wings, expansion taking place as completely as in the un mutilated specimen. On the approach of night the mutilated male makes no voluntary effort to use his wings. He is gentle and docile, and permits himself to be handled without betraying a desire to escape, or any sense of danger. If at this time, one endeavors to compel him to fly, he agitates his wings with a trembling motion; and if thrown into the air, uses them so ineffectually as not to break the force of his fall, or so as to precipitate him head foremost to the earth with a shock that appears to benumb him. By persistence he is at last, perhaps, driven to use the organs of flight; but whilst employing them with vigor, his position is reversed in mid-air, and he descends to the earth, vainly endeavoring to change it or arrest his fall; or he dashes himself with violence against some obstacle, thus bringing his flight to a sudden conclusion. *The power to hover has been completely lost.* After a few efforts of this kind, it becomes almost impossible to compel a mutilated specimen to attempt flight. It will remain fixed in one place, for two or three days, and at the end of that time may make a voluntary effort to use its wings. The irregularity, not to say the madness of its flight, is no less observable than in the beginning. Under these circumstances, one of my specimens escaped into the open air from my study in daylight. After extricating himself from amongst the branches of a tree standing near the door, he arose into the air in a spiral tract, around which he ascended until attaining a height at which he was almost lost to sight. Here he maintained himself by *sailing* on his wings until I lost sight of him by intervening houses. But, though I placed myself quickly in a position to see him again, he was no where visible, and must have descended suddenly from mid-air.

The males of the same species, taken by what is called *pairing*, in full possession of all their powers and instincts, and animated especially by the sexual, are strongly attracted by light. If the light in a room be so guarded that the specimen cannot injure itself, and a perfect male be held by the thumb and fingers beneath the wings and thrown with force in a direct line from the light, the individual, by the use of the wings will arrest himself as the force of the impulsion diminishes, and reversing

his position in the air will return to the light *in a direct line*. This may be repeated any number of times and will be followed invariably by the same result. Let the antennæ of the specimen then be excised in successive portions. The excision of the *upper third* does not diminish the power to arrest itself, and to return again in a direct line; but beyond this point, flight begins to be impaired without effecting in any manner the desire to return, until at least we reach a point where it becomes evident, that the voluntary direction of flight is no longer under the volition of the insect, or that some co-ordinating influence is wanting, having special relation to the direction of flight, or the uses of the muscles of the alary organs. Instead of being capable of arresting itself and returning in a direct path, the insect now darts from the point of arrest to the right or left, to the ceiling or the floor; and this uncertainty of direction and inability to arrest the force of the impulsion continues to increase, until we reach the neighborhood of the bulb, when the voluntary employment of the wings almost ceases.

All these results are obtained, simply by the excision of the pectinations of the antennæ, leaving the antennal stalks uninjured. The desire to fly is not affected in the first place, and it is only after the individual ascertains the uncertain nature of his efforts, that he fixes himself in a state of rest.

The structure of the organs, together with these experiments, entirely justify the inference: *That the antennæ, instead of being organs of any special sense as they are usually regarded, are in lepidoptera instruments of atmospheric palpation, having especial reference to the action and use of the wings during flight.*

This conclusion has been reached contrary to my own preconceived ideas of the function of these instruments, and I believe the view here taken is entirely new. Should the experiments be repeated by any observer, he should be careful to select for experimental study those lepidopterous insects, that are unprovided with *simple eyes* or *ocelli*, on the vertex at the base of the antennæ. In those species with *ocelli* on the vertex, flight is deranged scarcely at all, as compared with the effect of antennal excision on individuals unprovided with these organs.

TEGULÆ.

These organs are also known by the names *paraptera*, *paraptère*, *patagia*, *clavicule antérieure*, *wing-covers*, *shoulder-covers*. They are thoracic appendages which cover the base of the anterior wings, and are concealed from view by the scales which cover them and the thorax. They communicate with the interior of the thorax, by an opening or foramen, in the fibrous tissue connecting the base of the wings to the thoracic walls. They are hollow corneous bodies, tapering from their insertion, where alone they are fixed to the thorax, and the interior is unoccupied by any tissue whatever. The inner walls are lined with fibrous tissue, in which spiral tracheæ are

abundantly distributed, and which are either continued from one side to the other, or project into the interior as loops. I think the former is the case, yet I have an impression that I have seen loops on the inner surface, but in any event, the interior space serves to receive a large number of unprotected or free tracheal tubes. These arise almost erectly from the interior surface, seeming to pierce the chitinic walls. From these peculiarities of structure, I imagine their physiological function to be connected with the aëration of the circulating fluids.

The *Patagia* or the vesicular-like enlargements found on the dorsum of the prothorax of lepidoptera, have the same internal structure as the tegulæ, and communicate with the interior by openings or foramina. They are, indeed, simply folds of the prothorax on the dorsal surface, and are either fibrous or partially hardened by the deposition of chitinic matter. The *prothoracic spiracle* is placed between the lateral patagia and the base of one of the tegula. The mesothoracic and metathoracic segments are unprovided with spiracles, as in the embryonic state, but their analogues are found in the openings through which the tracheal vessels are distributed to the wings.

I cannot close this article without first making a few personal acknowledgments. I am indebted for many acts of disinterested kindness, and for much assistance in various ways, to my friend Mr. Samuel H. Scudder, Jr., of Boston, a pupil of Prof. Agassiz. He is, at the present time, engaged in collecting materials for a monograph of the family Hesperidæ, and those into whose hands this article may fall, will aid the development of entomological science in America, by contributing such specimens as their collections may contain, should he desire aid of this kind. They will be returned cheerfully after having been fully examined, should the contributor desire it. All such contributions, however, should be sent to the student *with the expenses prepaid*. The expenditures which the student is obliged to incur, are sufficiently onerous without being taxed in this manner, and are insignificant to each individual contributor. I trust there are but few entomologists or collectors in the United States, who would themselves display or encourage in others, that entomological selfishness respecting specimens, which induces the possessor of what is rare or difficult to obtain, to guard it with jealous and puerile exclusiveness, when so much must be done by the special student, to place lepidopterology with us in a condition of usefulness. An unstudied and unsystemized collection, has no value even to the possessor himself when it is not used for the advancement of science, and it would be quite as creditable, and quite as sensible, to devote time to forming a collection of curiously constructed horseshoes or any other objects, as to make one of insects, if the collector accumulates for the satisfaction given by the display, and pleasure of keeping it for himself and friends to gaze at and vapidly wonder over.

My acknowledgments are also due to Messrs. W. H. Edwards, of Newburgh, N.Y.,

Edward Norton, of Farmington, Conn., A. J. Packard, of Brunswick, Me., Archibald Hopkins, of Williamstown, Mass., and Robert Kennicott, of West Northfield, Ill., for the loan and contribution of specimens of the present family from their collections.

In conclusion, it is, perhaps, unnecessary to say to the student, that the general conceptions respecting the nature of the various natural groups heretofore treated, have been derived chiefly from the study of Professor Agassiz's philosophical and incomparable essay on Classification, contained in the first volume of his Contributions to the Natural History of the United States. Previously to the appearance of this work, my own studies had been specially directed to this subject, but with scarcely any satisfactory results. It gives me pleasure, therefore, to make here an acknowledgment of the essential aid, derived from the teachings of a naturalist so distinguished, whilst, at the same time, I alone am responsible for the errors, which have doubtless resulted from the application of the general principles, so ably and lucidly presented by their author.

I am indebted for the very full bibliography of species, to Mr. Francis Walker's List of the Specimens of Lepidopterous Insects in the collection of the British Museum, Part 8, which, however, has been carefully re-examined in so far as the books of reference were to be met with in our libraries. The specific descriptions have been drawn from actual specimens when they could be obtained, and when this has not been possible, the descriptions of Mr. Walker, sometimes modified from the figures of other authors, have been preferred as more accurate and reliable than any with which I have met.

In relation to the measurements, of the two giving the breadth of the head, the first gives the transverse diameter across the eyes, and the second that across the front at the base of the antennæ. These, when not expressed, must always be understood as lines and parts of lines.

Easton, Penn'a., June, 1859.

LEPIDOPTERA.

FAMILY SPHINGIDÆ.

The perfect insects included in this group, are characterized by the absence of simple eyes on the vertex at the base of the antennæ. The head is well developed, and well clothed with hairs, that but rarely show a tendency to become tufted; the antennæ are prismatic, and more or less thickened towards the tip, where they are recurved in the form of a hook, and surmounted by a ciliated seta; they are doubly ciliated in the males, on the sides of the plates prolonged beneath from the stalk, and nearly simple in the females: in some genera the terminal seta is obsolete, but the

stalk is distinctly prismatic, and the articles are ciliated or bear short pectinations in the males. The eyes are usually large, hemispherical and salient, and the palpi have the third article reduced to a mere point, placed on the summit of the well developed second article. The tongue is usually well developed, and nearly equal to the length of the body; in some instances it is more than twice longer than the body, and in others it is almost obsolete.

The thorax is always well developed and large, containing powerful muscles, that are attached to elongated, narrow and dense wings, the inner border of which is much shorter than the exterior, in consequence of the obliquity of the hind margin, and are attached to each other by a bristle and hook. They are characterized by the following peculiarities of structure. (See figures 1, 2.) The basal portions of the *marginal* and *costal nervures* are thick and strong, and contiguous to each other and the *subcostal nervure*; these and the *subcosto-marginal nervules* proceed towards the apex of the wing almost like a bundle of rods, thus forming an external margin capable of resisting rapid and strong vibrations upon the atmosphere. In addition to the *two marginal nervules*, given off from near the posterior-superior angle of the disc, the subcostal divides into a *subcosto-apical*, *post-apical* and *inferior nervules*. At the origin of the subcosto-inferior, the *discal-nervure* takes a transverse course, throwing off near its center, the *disco-central*, and joins the submedian at the origin of the *medio-superior nervule*; in addition to this, the median throws off more posteriorly the *medio-central* and *posterior nervules*. Lastly, near the inner margin is found the *submedian nervure*, which is simple and usually bifid at the base.

In the posterior wings, the *costal nervure* is simple and prolonged to the hind margin, and is connected with the subcostal towards the base, by a short *intercostal nervule*. The *subcostal nervure* subdivides into two branches, the *apical* and *post-apical*; the *discal nervure* arises at the bifurcation of the subcostal, and emits the *disco-central nervule* about its centre, and anastomoses with the submedian at the origin of the *medio-superior*. The *median nervure* is nearly straight, but angulated at the origin of the *medio-central*, and posterior to this point throws off the *medio-posterior*. The *submedian* and *internal nervures* are both simple.

This pterogostic structure, without undergoing any essential variation whatever from the type, is found in all the genera of the group.

The abdomen is usually cylindrico-conical, longer than the posterior pair of wings, sometimes tufted at the tip; and each of its segments are furnished on the posterior edges with a row of acute spinules concealed by a covering of scales.

The legs are usually long and strong, and the under surface of the tarsi roughened with numerous, acute, rigid spinules and furnished with a pair of free, simple claws. The anterior tarsi have a long single spur on the inner surface, the middle a terminal pair and the posterior two pair.

The eggs of the perfect insect are deposited singly on the food-plants of the larvæ, which are usually conspicuous in size when full grown, and live a solitary life. They have naked, cylindrical bodies, varying slightly in form, and presenting, usually, differences of ornamentation in the several genera. They possess eight pairs of feet, three of which are thoracic, four abdominal and one terminal; the latter are large, strong and almost square, with the plantæ situated at the anterior angle. On the dorsum of the eleventh segment is placed a rigid spine, called the *caudal horn*, and when this is absent it is replaced by a lenticular tubercle.

The pupæ are cylindrico-conical, with the extremity of the abdominal case terminating in single, stout, acute spine, and is contained in an imperfect cocoon, or near the surface in a cell, or in a subterranean cell.

Synoptical Table of Genera.

A. ANTERIOR WINGS ENTIRE.

I.* Terminal margin obliquely convex.

† Antennæ clavato-prismatic or prismatic, with a short hook and seta.

‡ Abdomen long, cylindrico-conical, not tufted at the tip.

1° *Tongue twice, or nearly twice, as long as the body.*

160. *Macrosila*.—Head large; eyes very large; wings rather broad, interior angle dilated.

S. Leucophæata.—Head large, eyes very large; wings narrow, interior angle rounded.

2° *Tongue nearly as long as the body, or somewhat longer.*

167. *Sphinx*.—Head rather long and narrow, eyes small; wings narrow and long.

Macrosila Forestan.—Head large and broad, eyes large; fore wings broad.

Wings rather short and broad, hind margin in middle slightly dilated.

178. *Dolba*.—Tongue a little longer than the body, eyes small, head broad and obtuse.

3° *Tongue two-thirds as long as the body.*

157. *Pachylia*, (*in part*).—Head large, prominent, eyes large; body thick and large.

148. *Darapsa*, Group II.—Tongue moderately long;

Interior border of wings straight.

187. *Lapara*.—Tongue moderate; head small and short; palpi very short; abdomen linear.

4° *Tongue about one-third as long as the body.*

178. *Ceratomia*.—Body thick; head small, eyes small; thorax short, globose; abdomen long

186. *Daremma*.—Body rather slender; tongue short, distinct; abdomen tapering.

5° *Tongue as long as palpi.*

187. *Ellema*.—Body subfusiform; head small, narrow, subtufted and sessile; eyes small.

†† Antennæ slender, minutely serrate-setose.

‡ Abdomen more or less tufted at the tip.

186. *Ænosanda*.—Head slightly crested; tongue moderate; palpi long and slender.

138. *Perigonia*.—Head rounded, smooth; tongue rather short; palpi very short and stout.

130. *Macroglossa*.—Head very broad; tongue one-half as long as body, eyes small; palpi broad beneath.

††† Antennæ subclavate or fusiform, with a minute hook.

‡ Abdomen not tufted at the tip.

188. *Arctonotus*.—Tongue obsolete or very short; body very pilose; abdomen hardly longer than thorax.

142. *Deilephila*.—Tongue as long, or nearly as long, as body; abdomen attenuated at tip.

‡‡ Abdomen tufted at the tip.

128. *Sesia*.—Wings hyaline in the middle.

130. *Macroglossa*.—Wings opaque; tongue as long as the body.

II.* Terminal margin wavy between nervules.

174. *Anceryx*.—Tongue as long as the body; head broad and conical, eyes large; wings narrow.

M. Antaeus.—Tongue nearly twice as long as the body.

S. Juglandis ♀.—Tongue nearly obsolete.

III.* Terminal margin nearly straight or slightly sinuate.

Anceryx Caicus.—Body rather long and slender, wings narrow.

† Antennæ with a long hook tapering to the end, ciliferous in ♂, simple in ♀.

‡‡ Abdomen thick and large; wings deeply concave on inner border.

Tongue two-thirds as long as the body.

157. *Pachylia*.—Interior angle of hind wings, covered with white scales; head broad, eyes large.

Tongue as long as the body.

153. *Philampelus*.

†† Antennæ somewhat fusiform, rather short, hook minute.

‡ Abdomen oblanceolate, body long and slender.

Tongue as long as the body.

Anterior wings narrow, tip very acute, often somewhat hooked.

149. *Chærocampa*.—Head large, conical; eyes moderate; abdomen with a slender pencil of hairs.

IV.* Terminal margin excavated by the tip, convex from the middle.

‡ Abdomen without apical tuft.

152. *Ambulyx*.—Wings narrow and very long; head prominent conical, obtuse; tongue long.

Tongue not quite as long as the body, or as long.

145. *Pergesa*.—Antennæ filiform, longer than thorax; body oblanceolate; wings slightly denticulated.

149. *Chærocampa* (*in part.*)

Tongue nearly obsolete.

S. Juglandis ♂.—Antennæ subpectinated.

Tongue about one-half as long as the body.

146. *Darapsa*.—Head subtufted, front nearly vertical, eyes small; antennæ with a long hook.

‡‡ Abdomen with apical tuft.

Fore wings with silvery streaks.

141. *Calliomma*, Group II.—Head prominent, conical; antennæ minutely serrate setose.

B. ANTERIOR WINGS NOT ENTIRE.

I.* Terminal margin angulated, denticulated, excised or indented.

1° Fore wings with angular indentations above interior angle.

‡ Abdomen with apical tuft.

132. *Proserpinus*.—Antennæ clavate with minute hook; tongue as long as body; eyes minute.

‡‡ Abdomen without apical tuft.

134. *Unzela*.—Antennæ rather slender; tongue moderately long.

2° Fore wings circularly excavated near the tip and interior angle, middle rounded.

136. *Thyreus*, Group II.—Head small, eyes very small; tongue equal to 3d abdominal ring.

3° Fore wings truncated at the tips.

† Angulated and denticulated.

‡ *Tongue nearly as long as the body.*

134. Thyreus, Group I. Abdomen with apical tuft; head broad and obtuse; eyes small.

†† Angulated in the middle.

‡‡ Abdomen with apical tuft.

139. Eury. — Antennæ subfusiform, short, with angular hook; tongue equal to 3d abdominal ring.

138. Perigonia. — Antennæ slender, setaceous; tongue rather short; head obtuse; palpi short.

‡‡‡ Abdomen without apical tuft, or scarcely tufted.

142. Calliomma, Group V. — Fore wings with silvery lines (*in note*).

180. Smerinthus (*in part*). — Tongue about as long as palpi.

137. Deidamia. — Tongue two-thirds as long as body; body fusiform.

††† Not angulated in the middle.

138. Perigonia. — Group II.

4° Fore wings denticulated

† Without silvery streaks.

180. Smerinthus. — Tongue about as long as palpi or almost obsolete.

†† With silvery streaks and angulated.

142. Calliomma. — Group IV.

SESIA, *Fabr.*

The body is pilose, stout and more or less oval or elliptical in outline, in the ♀, but more elongate and slender in the male. The thorax is advanced and tapers anteriorly to the head, which is small, but free and prominent, with the front broad; the eyes are very small; the palpi exceed the front and terminate acutely in a pencil of hairs; the tongue when unrolled extends to about the 5th abdominal segment; the antennæ are longer than the thorax, slender at the base, clavate and furnished with a minute seta at the extremity. The abdomen is tufted at the extremity, and about twice as long as the thorax. The wings are transparent in the middle; the fore wings with the hind margin entire, obliquely convex, and the inner margin concave beyond the inner angle; hind wings somewhat acuminate at the tip and short. The legs are slender and the hind tibiæ with four moderate spurs. *Male*, antennæ finely ciliferous. *Female*, nearly simple.

The Larva, tapers anteriorly, has a dorsal and stigmatal stripe, and a short recurved horn. It undergoes its transformation in an imperfect cocoon on the surface of the ground.

SPECIES.

1. DIFFINIS. — Thorax pale greenish yellow; abdomen beneath black, *legs black*.
2. THYSBE. — Thorax rather deep, obscure olivaceous; abdomen beneath rufescent, *legs whitish*.
3. FUSICAUDIS. — Light fawn color; abdomen deep red, with a row of testaceous spots along each side.
2. RUFICAUDIS of Kirby, a variety of Thysbe.
2. RUFICAUDIS of Walker, a variety of Thysbe?

1. *S. DIFFINIS*.—*Sphinx fusiformis* Abbot & Smith, I. p. 85, pl. 43. *Macroglossa diffinis* Boisd. *N. H. Ins. Lep.* I. pl. 15, f. 2. *Sesia diffinis*, Harris, p. 308, 2.

Head and thorax pale yellowish green; palpi blackish terminally and pale yellow beneath; breast pale yellow, with blackish hairs beneath the legs, and all the legs black. The abdomen adjoining the thorax has the thoracic hue; the third and fourth segments, sometimes only the fourth, are black or blackish along the sides of the four first anterior rings, and the fifth and sixth are pale brownish mixed with yellow. The ventral surface is bluish black, with pale yellow patches corresponding to the tufts on the margins of the fifth and sixth segments. The lateral anal tufts are black, the central pale brown. The disc of the anterior wings is transparent almost to the base, with a narrow, dark brownish border along the costa, a patch on the inner margin tapering to the inner angle, and a narrow terminal border in the ♂, but rather broad and dentate between the nervules in the ♀, of the same hue; a ferruginous patch on the apical interspace, sometimes followed by a smaller one in the succeeding, in the ♀. The posterior wings are bordered with dark brown on the costa near the base, broadly on the inner margin, the terminal margin in the ♂ very narrow, and moderate in the ♀.

There are variations in color; sometimes the thorax is fawn-colored above and somewhat ochreous beneath: the abdomen fawn-colored at the base, the two middle segments dark reddish brown, the ends and sides blackish and the two terminal rings fawn-color above, with two large yellow patches on the ventral surface which is black.

Egg. ?

Young Larva. ?

Mature Larva.—Pale pea-green, reddish beneath, with a dark green dorsal line, a pale yellow stigmatal stripe.

Pupation. ?

Food-plants. ?

Geographical distribution.—Canada, Northern and Southern United States.

Measurements—a male.

HEAD.		THORAX.		ABDOMEN.		BODY.	ANT. WING.
Length.	Breadth.	Length.	Breadth.	Length.	Breadth.	Length.	Length.
1.25	1.75—1.25	3.00	3.25	6.50	3.50	10.50	8.75

2. *S. THYSBE*.—*Sphinx Thysbe* Fabr. *Syst. Ent.* 548, 4; *Sp. Ins.* II. 155, 10; *Mant. Ins.* II. 99, 10. *Gmel. ed. Syst. Nat.* I. 5, 2388, 100. *Sesia Thysbe* Fabr. *Ent. Syst.* III. 1, 301, 10. *Sphinx Pelasgus*, Cramer III. 93, pl. 248, f. B. *Sesia Pelasgus* Harris, p. 308, 1. *Sesia Cimbiciformis* Steph. I. p. 135; Wood, pl. 53, f. 29. *Sesia Thysbe* Walker, p. 82. *S. ruficaudis* Kirby, IV. 303, Walker, p. 82?*

**Ruficaudis* of Kirby.—“Body yellow olive, underneath pale yellow. Antennæ black; fore wings reddish brown, hyaline in the disk, with the hyaline part half divided towards the base, with a costal bar; covered with yellow olive hairs at the base underneath the costa, the posterior margin and the nervures are dark ferruginous; there is also a yellow stripe on the inner side of the base; hind wings hyaline in the disk, base externally and costa yellow; internally the base is ferruginous; underneath the dark part of the wings is ferruginous and the base pale yellow; two first segments of the abdomen yellow olive, two next black, the rest ferruginous, with pale yellow lateral spots.”

Ruficaudis of Walker.—Fawn-color. Head whitish about the antennæ and beneath, with a brown band in front. Pectus testaceous. Abdomen deep red, fawn-color at the base, with testaceous spots along each side; hind borders of segments black; apical tuft red, with some black hairs on each side. Wings limpid, deep red at the base, and with broad deep red borders. Fore wings deep red at the tips and with a blackish discal streak. Length of the body 9—12 lines; of the wings 18—24 lines.

Head, palpi above and thorax dark green, mixed with brown; palpi on the sides blackish, beneath of a light cream color; the breast and legs, except the tibiæ of the hind pair, which are brownish, have the same yellowish-white hue. The eyes are slightly encircled with white scales. The two basal segments of the abdomen above are yellowish brown; the two middle are deep ferruginous or reddish brown, and the terminal have small ferruginous patches in the middle, the rest of each being a dull, yellowish brown. The ventral surface is bright ferruginous, with three or four small yellowish tufts between the segments on the line separating the dorsal and ventral surfaces; the lateral anal tufts are black, the central reddish brown and ferruginous beneath. The anterior wings, the basilar space, especially towards the inner margin, is ferruginous, and olivaceous toward the base of costa; the disc is divided by a dark brown line; the costa is dark brown and the broad terminal band has the same hue, with a ferruginous patch in the apical interspace. The posterior wings have a bright ferruginous, broad inner border, a moderately broad duller terminal band, the nervules in which are blackish.

Egg. ?

Young Larva. ?

Mature Larva. ?

Pupation. ?

Food-plants. ?

Geographical distribution.—Mass., Canada, New York, New Jersey, Penn'a.

Measurements—a Male.

HEAD.		THORAX.		ABDOMEN.		BODY.	ANT. WING.
Length.	Breadth.	Length.	Breadth.	Length.	Breadth.	Length.	Length.
1.50	2.00—1.25	3.25	3.25	6.00	4.25	11.50	11.50.

3. *S. FUSICAUDIS* Walker, p. 83.—Light fawn-color. Head beneath and pectus whitish testaceous. Palpi prominent. Abdomen deep red; basal part light fawn-color, bordered with white; a row of testaceous spots along each side. Apical tuft blackish brown; middle third part deep red. Wings limpid, deep red towards the base, and with very broad deep red borders. Fore wings fawn-color at the base, deep red towards the tips. Length of the body 13—14 lines; of the wings 25—27 lines.

Egg. ?

Young Larva. ?

Mature Larva. ?

Pupation. ?

Food-plants. ?

Geographical distribution.—Georgia.

MACROGLOSSA, Ochs.

The body is rather short, stout and thick. The head is large, broad and prominent; the antennæ with a minute seta and about as long as the thorax; the eyes small and rather flattened; the palpi thick and very broad beneath. The thorax is thick, well advanced in front of the anterior wings and tapering but little to the head. The abdomen is flattened beneath, tufted at the tip and about twice as long as the thorax. The legs rather slender; hind tibiæ with four moderate spurs. The wings are opaque; the length of the anterior is somewhat less than that of the entire body, rather more than twice longer than broad across the inner angle, and sometimes thrice; hind

margin entire, very obliquely convex, and the inner margin concave above the inner angle.

Larva.—The European type of this genus has a small head and a caudal horn on the 11th ring, and tapers anteriorly; the skin is finely shagreened and is marked by a stigmal and substigmal line. It undergoes its transformation on the surface of the ground in an imperfect cocoon. The pupa is elongated, with the head-case very salient.

SPECIES.

4. *Flavofasciata*.—Wings blackish brown, with a broad oblique luteous band.
5. *Thetis*.
6. *Tantalus*.—The third abdominal segment white or silvery on the dorsum.
7. *Ceculus*.—Hind wings with a central, pale orange-yellow band; abdomen with two lateral orange-colored spots at base, and two near tip.
8. *Sagra*.—Hind wings with a central and narrow terminal, pale yellow band; blackish at the base.

§ Antennæ subclavate; tongue as long as the body. (?)

4. M. FLAVOFASCIATA Walker, p. 87.—Testaceous blackish beneath. Head with a blackish band in front. Abdomen blackish, with a testaceous tuft on each side at the tip. Wings blackish brown, with a broad oblique luteous band. Fore wings somewhat luteous beneath toward the base. Length of the body 8 lines, of the wings 20 lines.

<i>Egg</i> .	?
<i>Young Larva</i> .	?
<i>Mature Larva</i> .	?
<i>Pupation</i> .	?
<i>Food-plants</i> .	?
<i>Geographical distribution</i> .—Albany River, Hudson's Bay.	

5. M. THETIS Boisduval, Ann. Soc. Ent. Fr. 3me ser.

§§ Antennæ slender, scarcely clavate prismatic; tongue about one-half as long as the body; not pilose.

6. M. TANTALUS.—Sphinx Tantalus Linn. Mus. Lud. 21, Fabr. Sp. Ins. II. 153, 1; Mant. Ins. II. 98, 1. Cram. I. 107, pl. 68, f. F.; Gmel. Syst. Nat. I. 5, 2386, 25. Sesia Tantalus, Syst. Ent. III. 1, 379, 1. Sphinx Ixion, Syst. Nat. II. 803, 26. Sp. Ins. II. 154, 2; Mant. Ins. II. 98, 2; Gmel. Syst. Nat. 5, 2386, 26. Sphinx zonata Drury, I. 57, pl. 26, f. 5. Sphinx Titan Cram. II. 73, pl. 142, f. F. Aellopus Tantalus Hübn. Exot. Schmet. Macroglossum annulosum Swainson, III. pl. 132, f. 1. Macroglossa balteata Kirtland, Sill. Jour. Sci. 13 N. S., 39, p. 337. Macroglossa Tantalus Walker, p. 88.

Head, palpi above and thorax brown, but in the recent specimen tinged with deep olivaceous; palpi beneath whitish, and the breast and legs ash-colored or brownish white in the male, in the female these parts have a more or less brownish hue. Abdomen brown or olivaceous brown, with the third segment banded above with white; beneath brown, the upper segments in the males having an ashy hue, with four white points on the lateral, hind portions of the ventral segments; lateral terminal tufts blackish brown, the central testaceous. Anterior wings ferruginous-brown with a double row of whitish spots extending from the discal spot to the inner margin; discal spot blackish surrounded with white; with three white subterminal

spots approximated in the subcosto-inferior, medio-superior and central interspaces, and a terminal dull brownish band. Posterior wings blackish, costal border pale brownish white, fringe above white and short.

From the Smithsonian Institution. Capt. Pope's Collection in Texas.

Egg. ?

Young Larva. ?

Mature Larva. ?

Pupation. ?

Food-plants. ?

Geographical distribution.—S. America, Mexico, West Indies, Texas, Ohio.

Measurements—a Male.

HEAD.		THORAX.		ABDOMEN.		BODY.	ANT. WING.
Length.	Breadth.	Length.	Breadth.	Length.	Breadth.	Length.	Length.
2.00.	2.75-2.00.	4.00.	3.25.	9.00.	4.50.	14.50.	12.00.

7. M. CECULUS.—*Sphinx Ceculus Cramer* II. 80, pl. 146, f. G. *Psithyros Ceculus Hübner*. *Verz. Schmett.* 132, 1411. *Macroglossum fasciatum Swainson*, III. pl. 132, f. 2. *Macroglossa Ceculus Walker*, p. 89.

Head, palpi and thorax obscure brown; palpi beneath and breast white. Thorax with a blackish patch above the base of the wings. Abdomen brown inclining to blackish posteriorly, with two orange-colored spots on each side of the second and third segments, a blackish brown patch on the fourth and a pale yellow spot on the fifth, with a lateral tuft beneath it of the same hue. Terminal tufts dark brown. Abdomen beneath brown. Anterior wings obscure purplish brown, varied with dark brown; a dark brown patch at the base, with a line and band of the same hue crossing the disc; a dark brown demi-line extending from the origin of the medio-central nervule to the inner margin, and a line crossing the base of the nervules furcate above, with a subterminal band also furcate toward costa, of the same hue; a white spot in medio-central interspace. Posterior wings blackish-brown, with a central pale orange yellow band.

Collection of the Acad. Nat. Sciences, Philadelphia.

Geographical distribution.—S. America, Mexico.

8. M. SAGRA *Poey*, *Cent. de Lep. de l'Ile de Cuba*, *Decade* II., with figure. *Walker* p. 89.

Cinereous brown, testaceous beneath. Thorax with two ferruginous stripes on the sides, margined between with hoary. Abdomen ferruginous, tessellated with hoary, with two pale yellow spots on sides of middle segments, and two rows of white spots beneath. Wings rather broad, with a white line near the base and varied with ferruginous bands, especially a broad interrupted one near external border; a white spot toward the end of medio-central interspace. Posterior wings blackish, with an oblique, central, pale yellow band, and the exterior border margined with the same hue.

S. America, West Indies.

Mr. Walker refers this species to the *MS.* of Boisduval. Prof. Poey described it, however, in 1837 under its present name.

PROSERPINUS, *Hübner*.

The body is rather long, slender and tapering. The head is free, prominent and moderately large; the front broad, oval and obtuse; the antennæ subclavate, longer than the thorax, with a minute terminal setigerous hook; the eyes minute and shaded with hairs from above; the palpi are pilose, rather thick and equal to the

front; the tongue as long as the body. The thorax is advanced and tapers in front to the head, and is smooth. The abdomen is twice longer than the thorax, cylindrico-conical, with an abundant terminal tuft in both sexes; very sparingly tufted on the sides. The legs are slender and smooth, the posterior tibia with four moderate spurs. The anterior wings are as long as the body without the tuft; three times longer than wide across the inner angle; tip acuminate, the hind margin entire and obliquely convex from the tip to the medio-posterior interspace, where it is angularly indented; the inner angle salient and the inner margin concave above it. Hind wings rather short, obtusely rounded at the tip and the hind margin entire. *Male*.—Antennæ finely ciliferous. *Female*.—Antennæ simple.

Larva.—Tapers anteriorly from the third segment, body cylindrical, head small and the eleventh segment with a caudal horn. It is ornamented with rows of vascular round spots, and irregularly elliptical subdorsal and lateral spots. The metamorphosis takes place on the surface of the ground in an imperfect cocoon.

Duponchel describes the larva of this genus, under the name *Pterogon*, as having a lenticular tubercle instead of a caudal horn. The outline of the wings, as given in the diagnosis, differs also from the European type, in which the fore wings are slightly hooked, with two or three distinct dentations. Abbot and Smith represent the wings of *Gauræ* with these peculiarities, but my specimens do not correspond.

SPECIES.

Gauræ.—Olivaceous, with the hind wings reddish yellow and a terminal black border.

Clarkiæ.—A variety of *Gauræ* or the same?

9. P. GAURÆ.—*Sphinx Gauræ* Abbot & Smith, I. 61, pl. 31. *Proserpinus Gauræ* Hübn. Verz. Schmett., 122, 1414. *Thyreus Gauræ* Walker, p. 100.

Antennæ brownish green and whitish at the tips. Palpi beneath, white; the tips of the palpi, head and thorax greenish, with a greenish white line on the sides of the head and thorax. Abdomen greenish or brownish green, and the apical tuft the same, with the hind portions of the segments paler. Anterior wings pale yellowish green, with deep green shades; the basal portion pale yellowish green, with a broad, median dark green band, the anterior edge of which is concave, and its posterior, beginning on the costa at the origin of the post-apical vein, inclines to about the middle of the inner margin. The median band is bordered posteriorly with pale yellowish green, and the terminal border is shaded with bright greenish, deepened toward the costa and tip, with a pale streak at the tip and a pale line from the costa to subcosto-inferior vein. The discal spot is dark green on a somewhat lighter ground. Posterior wings orange, with a narrow terminal blackish band; sometimes the orange color is deepened to reddish above the terminal band; fringes paler.

Smithsonian Institution. From Lieut. Craunch's collection, Texas.

Egg.

?

Young Larva.

?

Mature Larva.—Head green. Body dark green; with the first segment banded with white containing four black points; with a row of vascular black dots, and two rows of semi-elliptical black dorsal patches

edged with white, and a row of lateral somewhat oval patches, blackish and crimson behind, also edged with white; a row of subdorsal dots between this and dorsal patches; prolegs crimson, with crimson patches on the sides of the tenth and eleventh segments. Horn yellow at the base and black terminally. *Abbot & Smith.*

Pupation.—The larva enters the pupa state in Georgia about the latter part of May, and appears as a perfect insect during the middle of June. (*Abbot & Smith.*) In Texas there are two broods of perfect insects, according to the dates of capture, one during the entire month of April and another in July.

Food-plants.—*Gaura biennis.*

Geographical distribution.—Georgia, Texas.

10. P. CLARKIÆ *Boisd. Ann. Soc. Ent. Fr. X. 2me p. ser. 318.*

The appearance (port) and size of *Gauræ* of Georgia. Superior wings of an olive green, with the extremity faintly tinted with a little greenish white and a transverse whitish, nearly straight band. Inferior wings of the same yellow color as the European *Enotheræ* with a little black border. The four wings of an olivaceous green beneath, with a whitish band on the inferior wings. Body olivaceous.

California.

UNZELA *Walker.*

Body fusiform, rather stout. Proboscis moderately long. Palpi as usual. Antennæ rather slender. Abdomen much less than twice the length of the thorax. Legs moderately stout; hind tibiæ with four rather short spurs. Wings moderately broad, not long. Fore wings straight along the costa, rounded at the tips; exterior border slightly oblique, forming a very obtuse and much rounded angle in the middle, with a slight excavation in front and two shorter and more distinct indentations behind. Hind wings rounded at the tips; exterior border slightly denticulated, somewhat excavated toward the interior angle.

11. U.? JAPYX.—*Sphinx Japyx Cramer, I. 137, pl. 87, f. C.; Enyo Japix Hübn. Verz. Schmett. 132, 1416; Unzela? Japyx Walker, p. 162.*

Ferruginous brown. Abdomen purplish with testaceous bands on the hind portions of the segments and a white transverse band at the base of the abdomen. Thorax dark brown. Anterior wings dark brown from the base to the middle, with two somewhat roseate, separated, oblique lines crossing the middle of the disc and a round spot at the base margined with roseate; terminal portion of the wing greenish with a black spot on costa at about the origin of post-apical nervule, another beneath the tip on posterior margin and a larger one at the inner angle, containing a small blue spot. Posterior wings dark brown, somewhat roseate on inner margin, with a black terminal line.

THYREUS *Swainson.*

The body is obtuse, broad and stout. The head is moderate, the front obtuse, nearly vertical, uniformly broad and thickly haired; the palpi very hairy, rather short and obtuse; the eyes small: the tongue, when unrolled, reaches to about the fourth or fifth abdominal segment; the antennæ taper at the extremity and end in a long hook without seta. The abdomen is broad and rather short, a little more than

once and a half longer than the thorax, semi-oval in outline, tufted with terminal and lateral tufts. The thorax is thick, hairy, globosely rounded in front with meta-thoracic sub-tufts. The wings are narrow and rather long. The anterior in length equal to that of the body, truncate at the tips, angulated opposite the medio-superior nervule, excavated from post-apical to superior and doubly excavated from the superior nervule to the inner angle. Posterior wings, tip rounded, hind border denticulated and the inner angle somewhat salient and acute. *Male*.—Antennæ ciliferous. *Female*.—Almost cylindrical and simple.

Larva.—The head is moderate and the body is naked, wrinkled transversely, and tapers gently from the fourth segment, and is furnished with a lenticular tubercle on the eleventh segment instead of a caudal horn. Its position when disturbed is not sphinx-like; it shortens the anterior rings and throws the head from side to side, making at the same time a crepitating noise. When on the ground its motions under irritation are often violent. It prepares for pupation on or near the surface of the ground.

12. T. ABBOTTI *Swainson*, I. pl. 60. *Harris*, p. 307, 2. *Kirtland*, *Proc. Acad. Nat. Sci.*, 1837, p. 148

Head, palpi and thorax dull chocolate brown; prothorax with a blackish-brown transverse line and two others crossing the middle of thorax; abdomen dark brown, lighter in the middle; terminal tufts dull yellowish-brown in the male, and female with a large light yellowish central pencil and small lateral brownish ones. Anterior wings dull chocolate brown, lighter beyond the middle, even yellowish-brown in the female; an oblique dark brown line passing behind and near to the minute dark brown discal dot; several dark brown lines on the inner margin and curving obliquely to the lower part of medio-superior nervule, and proceeding thence to the costa as sharply angulated lines and long dark brown dashes projecting upward in the interspaces; apical interspace grayish brown, with a dark brown sagittal dash on the margin and others in the three following marginal interspaces: fringes dark brown. Posterior wings sulphureous, with a dark brown terminal band, breaking into a series of short lines in a slightly roseate space above anal angle; fringes brown.

Egg.

?

Young Larva.

?

Mature Larva.—*Male*.—Head dark brown, banded broadly at sides with light green and with a narrow, central short greenish band. Body reddish brown, with numerous patches of light green, oval on the dorsum and irregularly triangular on the sides, with an interrupted, subdorsal chocolate colored line. The lenticular tubercle on the eleventh segment is black, encircled at the base by a yellowish line and a blackish cordate patch; anal shield pale green terminally and brown above, crossed by irregular brown lines. *Female*.—Body uniform reddish brown or blackish brown, immaculate; with interrupted dark brown subdorsal lines and numerous transverse striæ. Length about three inches. *Swainson's* figure of this larva is erroneous.

Pupation.—The transformation of the larva takes place in a superficial cell. The pupa is dark brown; the head case broad and rounded; the tongue case not apparent and level with the breast. There is, I think, but one annual brood. The larva reaches its development about the latter part of *July*, and enters the pupa state to appear in the following spring as an imago.

Food-plants.—The indigenous and cultivated grape vines, and *Amphelopsis quinquefolia*.

Geographical distribution.—New York, Pennsylvania, Georgia, Massachusetts, Ohio.

Measurements—a Male.

HEAD.		THORAX.		ABDOMEN.		BODY.	ANT. WING.
Length.	Breadth.	Length.	Breadth.	Length.	Breadth.	Length.	Length.
2.00	2.50—1.50	3.50	4.25	6.50	5.00	12.00	13.00

GROUP II.

The thorax tapers on the sides markedly to the head, which is small and prominent. The front is smooth and narrow, the eyes very small, the palpi acutely haired at the extremity and exceeding the front, the antennæ with a moderate hook without seta; the tongue extends to about the third abdominal ring. The tip of the anterior wings is rounded, the hind margin circularly excavated beneath tip and above the inner angle, the middle being convex. Posterior wings, hind margin scarcely denticulated and slightly excavated near the inner angle.

13. T. NESSUS.—*Sphinx Nesus Cramer*, II. 9, pl. 107, f. D. *Fabr. Sp. Ins.* II. 140, 2; *Mant. Ins.* II. 92, 2; *Ent. Syst.* III. 1, 355, 2. *Gmel. Syst. Nat.* I. 5, 2372, 91. *Amphion Nesus Hübner Verz. Schmett.*, 135, 1444. *Thyreus? Nesus Harris*, p. 308, 3. *Walker*, p. 99.

The head, palpi and thorax dull ferruginous brown, palpi beneath and breast rufescent; a yellowish-white streak on the sides of the head and thorax, and a transverse ferruginous line on the hind part of metathorax. The abdomen a dark chestnut brown, with the hind margins of fourth or fourth and fifth segments pale yellow, with three or four bright ferruginous, lateral spots beginning on the fourth segment, and two very small pure white tufts on the segments adjacent to the triple apical tuft, which is deep chestnut; beneath rufescent, with three lateral white dots on the hind portions of the posterior segments. Anterior wings brown, with a purplish hue, costa grayish brown; an indistinct dark brown band and line in basilar space; a dark chestnut, broad median band, divided above the medio-superior nervule to the costa, and containing a lighter colored discal spot; a grayish brown subterminal line interrupted by the central nervules and edged anteriorly with brownish, with a long, dark chestnut patch interposed in the medio-central interspace; a ferruginous patch at the base of apical interspace, with two dark brown adjacent patches in the succeeding interspaces. The fringes dark brown in the middle, pale yellow in the excavations and bordered by dark brown. Posterior wings bright red with a dark brown terminal band; fringes from the tip to the centre brownish, and thence to anal angle pale yellow.

Egg. ?

Young Larva. ?

Mature Larva. ?

Pupation. ?

Food-plants. ?

Geographical distribution.—Canada, Massachusetts, New York, Pennsylvania, New Hampshire.

Measurements—a Male.

HEAD.		THORAX.		ABDOMEN.		BODY.	ANT. WING.
Length.	Breadth.	Length.	Breadth.	Length.	Breadth.	Length.	Length.
1.50	2.00—1.25	2.75	3.50	5.75	4.00	9.75	9.50

DEIDAMIA.

Size moderate. The body is quite fusiform and the inclination of the sides of the thorax to the head is quite abrupt. The head is small, almost impacted on thorax, but not depressed; it is compressed laterally and subtufted, the front vertical and moderately broad; the eyes small and somewhat sunken; the labial palpi short and pilose; the tongue extends to the end of the third abdominal segment; the antennæ taper at the end, slightly hooked and without the terminal seta. The thorax is thick and well clothed with long decumbent hair. The abdomen is long, rather slender and oblanceolate, with an exceedingly slight terminal tuft. The legs are rather slender and moderately long, the anterior tibiæ tufted at the sides; the posterior with two very short middle and terminal spurs concealed in the tibial hairs. The anterior wings are about equal in length to that of the body, and are a little more than twice longer than broad across the inner angle; the hind margin angulated in the middle, truncate at the tip, excavated from the post-apical nervule to the medio-superior and angularly indented above the inner angle; the inner margin concave. The posterior wings are rounded at the tips, hind margin slightly denticulated. The submedian nerve is simple at the base. *Male*.—Antennæ ciliferous. *Female*.—Antennæ simple.

14. D. INSCRIPTA.—Pterogon? inscriptum *Harris*, p. 308. Thyreus? inscriptus *Walker*, p. 100.

The head is grayish brown and whitish above the eyes; palpi reddish brown. Thorax grayish brown, with a double, curved white line crossing the prothorax, edged behind with brown, and a brown sagittal dorsal patch, with a short whitish line across the middle of tegulæ. The abdomen is dull brown above, with three or four subdorsal, deep brown spots; beneath, a dull ferruginous brown, with the hind portions of the segments of a lead color. Anterior wings ash-gray at the base, in the middle and towards the tip, banded with brown; a short, obscure, brown costal streak at the base; two brownish bands before the middle united on the inner margin by blackish brown; discal spot ash-gray; a reddish brown band, arising on the costa at the origin of post-apical nervule, convex in the middle, and retreating thence to the inner margin; the subcosto-inferior and medio-superior interspaces pale brown, as well as the portions of the succeeding interspaces exterior to the band, and marked by reddish brown lunules; a deep brown apical patch encircled with white; and a subterminal one similarly colored in post-apical interspace. Posterior wings dull reddish brown, with a dusky terminal border tapering to the inner angle; fringes white.

From the collection of Mr. W. H. Edwards, of Newburg, N. Y.

Egg. ?

Young Larva. ?

Mature Larva. ?

Pupation. ?

Food-plants. ?

Geographical distribution.—Indiana, Long Island, New York, Pennsylvania.

Measurements—a Male.

HEAD.		THORAX.		ABDOMEN.		BODY.	ANT. WING.
Length.	Breadth.	Length.	Breadth.	Length.	Breadth.	Length.	Length.
1.50	1.75—1.00	2.50	3.25	6.00	2.75	10.50	10.00.

PERIGONIA, *Boisd.*

Body broad, slightly fusiform. Head obtuse. Proboscis rather short. Palpi very short and stout. Antennæ setaceous, slender, a little longer than the thorax. Abdomen much longer than the thorax. Legs rather slender; hind tibiæ with four moderately long spurs. Wings opaque, moderately broad. Fore wings hardly convex toward the tip of the costa, rather oblique along the exterior border, which is slightly angular in the middle and behind the tip; fourth inferior vein (posterior) remote from the others. Hind wings very slightly denticulate along the exterior border. *Male*.—Antennæ minutely serrate setose. *Female*.—Antennæ simple.—*Walker*.

15. *P. LUSCA*.—*Sphinx Lusca Fabr. Sp. Ins.* II. 140, 5; *Mant. Ins.* II. 92, 5; *Ent. Syst.* III. 1, 356, 6. *Gmel. Syst. Nat.* I. 5, 2372, 51. *Perigonia stulta Boisd. Herr. Sch. Lep. Exot. Sp., Nov. Ser.* 1. *Perigonia Lusca Walker*, p. 101.

Ferruginous brown, somewhat cinereous and testaceous beneath. Fore wings with three grayish, diffuse bands and transverse blackish lines. Posterior wings with variable luteous bands and streaks along the interior angle.

Geographical distribution.—Mexico, South America, West Indies.

GROUP II.

Fore wings not angular in the middle of the exterior border, and are excavated behind the sub-apical angle. The exterior border of hind wings convex and not denticulated. Head conical.

16. *P. SUBHAMATA Walker*, p. 102.

Brown (male) or ferruginous (female), paler beneath. Wings with oblique, undulating, pale ferruginous bands, which are most numerous on the fore wings, and the latter have a discal dot of the same hue, and a cinereous subapical spot. Length of the body 13—15 lines; of the wings 28—32.

Geographical distribution.—Mexico and South America.

GROUP III.

Head rounded in front, not conical. Fore wings somewhat rounded at the tips, slightly convex and not excavated along the exterior border, which is very oblique.

17. *P. GLAUDESCENS Walker*, p. 103.

Brown, testaceous beneath. Head with a white streak on each side behind the eye. Antennæ tawney, very slender, not longer than thorax. Thorax slightly tinged with green. Abdomen ferruginous, slightly glaucous; fifth segment whitish; sixth and seventh segment with a whitish tuft on each side; apical tuft blackish. Wings reddish beneath. Fore wings with a glaucous tinge, and with two oblique bands, the one dark brown and interior, the other ferruginous and exterior, and bordered with dark brown on its outer side. Hind wings dark brown, with a luteous spot by the interior angle, and a white speck near the base of the interior border. Length of the body 12 lines; of the wings 28 lines.

18. *P. UNDATA Walker*, p. 103.

Brown. Head beneath and pectus somewhat hoary. Thorax with a short, broad, posterior, dark brown stripe on each side. (Abdomen and hind wings wanting.) Fore wings cinereous, shining, with a white

dot and a black discal streak at the base, with a white streak traversing the black discal spot, and with two broad, irregular, ferruginous bands, which are bordered, and the exterior one interlined with black. Length of the body 9 (?) lines, of the wings 18 lines.

Geographical distribution.—Jamaica.

ENYO *Hüb.*

The body is long, thick and fusiform. The head large, prominent and broad; front nearly vertical, flattened, and smooth; eyes large and salient; palpi smooth, stout and closely applied to the front; tongue extends to the end of the third abdominal segment; antennæ rather short, not as long as the thorax, minutely ciliferous, fusiform and ending in an angular hook with seta. The thorax is crested in front, long from the base of anterior wings to the head, and rounded in front. The abdomen is oblanceolate, slightly more than twice longer than the thorax, and sparingly tufted at the apex. The legs are slender, the anterior and middle smooth, the posterior with femora and tibiæ pilose, with two short and two moderately long spurs. The anterior wings are very oblique, length much less than that of the body, and somewhat more than twice longer than broad across the inner angle; the posterior margin truncate at the tip, obtusely angulated opposite medio-superior nervule, excavated from post-apical to superior, and thence excavated and slightly wavy to the inner angle, which is hooked; inner margin deeply concave. Posterior wings rounded at tip; hind margin doubly excavated from the medio-central to inner angle, which is acute.

Larva.—Head rather small; body tapers anteriorly, and is wrinkled transversely, with a long, straight, caudal horn. *Pupa* rather slender; head case obtuse; tongue-case not apparent. The larval transformation is subterranean.

19. E. LUGUBRIS.—*Sphinx lugubris* Drury, I. 61, pl. 28, f. 2. *Fabr. Sp. Ins.* II. 140, 4; *Mant. Ins.* II. 92, 4; *Ent. Syst.* III. 1, 356, 5. *Gmel. Syst. Nat.* I. 5, 2372, 50. *Abbot & Smith*, I. pl. 59, pl. 30. *Thyreus lugubris* Harris, p. 306. *Sphinx Fegens* Cramer, III. 56, pl. 225, f. E. *Enyo lugubris* Hüb. *Zutr.* 595, 6. *Walker*, p. 113.

Head, palpi, thorax and abdomen brown, with an obscure purplish or reddish hue; palpi beneath pale reddish brown. Abdomen with an indistinct double row of dorsal, dark brownish spots; beneath as well as the thorax, pale rufescent brown, with a tawny line in the middle of ventral surface; yellow lateral dots on the hind portions of the segments, and a small lateral, pale yellow pencil of hairs at the base of the first segment. Anterior wings brown, with a rufous tinge in the middle and toward the tip; an oblique, pale brown line before discal spot, beginning near the origin of subcosto-inferior vein, margined on each side with darker brown; discal spot blackish, edged with pale brown; a broad, dark brown, subterminal shade, extending from post-apical vein to the hind margin, and bordered anteriorly by a curved, pale brown line; a ferruginous brown spot in apical interspace, with its basal portion and the middle of the next interspace pale reddish hue and three indistinct brownish lines crossing the nervules. Posterior wings brownish, deepening toward terminal margin, with indistinct lines above the inner angle, and dark brown marginal spots at the inner angle and on the ends of medio-posterior and central veins.

Coll. Acad. Nat. Sciences, Philadelphia, and Mr. W. H. Edwards, of Newburg, N. Y.

Egg. ?

Young Larva. ?

Mature Larva.—Head dark green, with a yellow frontal band. Body pale green, with vascular dark green dashes, and a dark green subdorsal line bordered beneath with whitish; nine short, lateral, pale yellow bands; horn dark green; stigmata reddish. (*Abbott & Smith.*)

Pupation. ?

Food-plants.—*Amelopsis hederacea*. (Virginian creeper.)

Geographical distribution.—Georgia, West Indies, Mexico, South America.

Measurements. [*Lugubris.*]

HEAD.		THORAX.		ABDOMEN.		BODY.	ANT. WINGS.
Length.	Breadth.	Length.	Breadth.	Length.	Breadth.	Length.	Length
♂ 2.25.	2.75—1.50.	3.75.	3.50.	8.00.	3.50.	13.50.	10.00.
♀ 2.50.	3.00—1.75.	4.00.	4.50.	8.75.	4.00.	15.50.	12.50.

§ Thorax scarcely crested.

20. *E. CAMERTUS.*—*Cramer*, III. 53, pl. 225, f. A. *Enyo camertus* *Hubn. Verz. Schmett.* 132, 1420. *Walker*, p. 114.

Mouse color; abdomen with a double row of blackish brown spots. Fore wings with a testaceous discal spot; with a blackish oblique interior line margined with hoary, and a large diffuse exterior blackish patch, with a sub-apical ferruginous spot and a blackish submarginal line edged with white. Posterior wings with dark oblique undulating lines and blackish marginal spots.

Mr. Walker's description does not correspond well to Cramer's figure, which is dark brown, and the anterior wings luteous brown, with a broad dark brown median band tinged obscure purple. The following individual from Brazil, in the collection of the *Acad. Nat. Sciences of Philadelphia*, appears to me to come nearer to Cramer's figure.

Dark brown; thorax distinctly crested. Abdomen dark brown with a double row of spots on the sides, and a small lateral rufous terminal tuft and a long central one dark brown, with a cinereous ring just above them; beneath, a dull cinereous central line edged with dark brown. Anterior wings dark brown varied with obscure purplish; basal portion dark brown, with a dark median patch chiefly beneath the median nerve and intersected by paler lines on the inner margin, and bordered behind and above broadly with a paler hue; a dark brown patch extending from the origin of subcosto-inferior vein to the tip of post-apical, excavated on each side beneath, and extended as a line to the margin at the end of medio-posterior vein, enclosing a lighter patch in the middle on the costa, and at the tip mixed with rufous; a testaceous curved marginal patch. Posterior wings dark brown, paler towards the hind margin. *Posterior legs hairy to the end of the tarsi.*

Geographical distribution.—Mexico, West Indies, South America.

CALLIOMMA *Boisd.*

Body stout. Head prominent, conical. Antennæ setaceous, minutely serrate-setose, a little longer than the thorax. Abdomen oblanceolate. Legs rather stout; hind tibiae with four moderately long spurs. Wings moderately broad. Fore wings undulating or excavated or denticulated along the exterior border; second inferior

vein not more remote from the third (*central*) than from the first (*disco-central*); fourth (*posterior*) very remote from the third (*central*). Hind wings with the exterior border slightly excavated.

The genus is divided in to several groups found for the most part in South America, and as it is probable many of the individuals exist in the southern portion of our own continent, the diagnoses of the South American groups will be given.

SPECIES.

21. LYCASTUS.—Hind wings rufo-ferruginous, with pale purple lines.

VOLATICA (*in note*) new sp.—Hind wings reddish brown, with pale yellowish brown central band. (*Brazil.*)

GROUP I.

Head elongato-conical, acuminate. Fore wings slightly hooked at the tips, undulating, and very oblique along the exterior border. Hind wings acuminate, slightly excavated, and undulating, but not denticulated along the exterior border.

No North American representatives described.

GROUP II.

Head conical, obtuse. Fore wings concave behind the tips, which are hooked and acute, convex, and hardly emarginate from thence to the interior angle. Hind wings slightly excavated near the interior angle, almost straight from thence to the tips, which are acute.

21. C. LYCASTUS.—*Sphinx Lycastus Cramer*, IV. 180, pl. 381, f. A. *Oreus Licastus Hübn. Verz. Schmett.* 136, 1465. *Sphinx Parce Fabr. Sp. Ins.* II. 148, 42; *Mant. Ins.* II. 95, 46; *Ent. Syst.* III. 1, 372, 50. *Gmel. Syst. Nat.* I. 5, 2382, 80. *Calliomma Lycastus, Walker* p. 110.

Fawn color; palpi ferruginous and thorax with two large triangular ferruginous patches. Abdomen with dorsal brown spots, sometimes absent. Anterior wings luteo-fawn color, or grayish, glaucous, testaceous or white, and sometimes varied with brown; a white spot at the base and discal silvery streak. Posterior wing rufo-ferruginous; a brown spot near the interior angle, with pale purple lines.

In Cramer's figure the anterior wings are represented dark brown with two pale, somewhat roseate white patches about the middle of costa, a larger one at the base of the inner margin and a small one about the middle of the inner margin; silvery dashes near the base, around the front costal spot and behind the second and on the inner margin behind the last spot, with a curved brown line in a grayish space at the tip.

Geographical distribution.—South America, West Indies.

GROUP III.

Head elongato-conical, obtuse. Fore wings slightly acuminate; exterior border almost straight along each side of an extremely obtuse angle, which is rather in front of the middle. Hind wings rather deeply denticulated, especially toward the interior angle, which is prominent.

No North American representatives have been described ; vid. *Cramer*, III. 40, pl. 216, f. E.

GROUP IV.

Head conical, obtuse. Wings rather broader than in the preceding groups. Fore wings slightly acuminate, but not hooked at the tips, moderately oblique, and distinctly denticulated along the exterior border, which forms a well defined angle in the middle. Hind wings somewhat denticulated along the exterior border, which is slightly excavated towards the exterior angle.

No North American representatives described : vid. *Cramer*, III. 40, pl. 216, f. F.

I have not been able to find that the following species, which I found in the collection of the Academy of Natural Sciences has been heretofore described. It does not belong properly to this synopsis, being a South American insect, but I have thought it advisable, nevertheless, to include it in a note.*

DEILEPHILA *Ochs.*

The body is usually stout and thick. The head moderate, prominent; the front smooth, rather broad and long, semi-elliptical; the eyes moderate; the tips of the palpi level with the front; the tongue as long or nearly as long as the body; the antennæ clavate, terminating suddenly in a minute hook and seta. The thorax is thick and tapers abruptly to the head. The abdomen is thick and cylindrico-conical, about twice as long as the thorax and tapers rather suddenly at the terminal segments, having at the tip a more or less distinct, short pencil of hairs. The wings are entire; the length of the anterior equal to that of the body, rather more than twice and a half

GROUP V.

* Head prominent, free and long; front nearly horizontal, palpi thick with the tips obtuse and level with the front; eyes small; tongue about two-thirds as long as body; antennæ slender, longer than thorax. Thorax advanced and tapering to the head. Abdomen oblongate, twice as long as the thorax. Anterior wings rather narrow, hind border truncate at the tip; excavated from postapical nervule to the medio-superior, where it is angulated, and thence excavated to interior angle, which is prominent; inner border deeply concave above the inner angle. Posterior wings rounded at the tip, hind border excavated before the inner angle, which is rounded. Spurs of posterior tibiae approximated and moderate.

C. VOLATICA.—Head, thorax and abdomen yellowish brown, with a dark brown dorsal line on head and prothorax and a silvery transverse stripe on the basal abdominal segment. Palpi beneath and breast pale ochreous. Anterior wings pale yellowish brown, with a dark reddish brown oblique band, composed of several lines extending from the costa at about the origin of subcosto-inferior nervule to the inner margin and edged toward the base of the wing with a double silvery band; a short bifid reddish brown line on the base of disco-central nervule, and a slender line of the same hue along the medio-superior, with a wavy brownish line crossing the median veins in the middle and an irregular subterminal wavy reddish brown line, bordered exteriorly with a reddish brown shade in atoms. Posterior wings reddish brown, with a pale yellowish central abbreviated band. Collection of the Acad. Nat. Sciences of Philadelphia.

Brazil.

longer than broad, the hind margin obliquely convex; the inner somewhat concave above the interior angle. The posterior wings are rounded at the tip and the hind border slightly excised near the interior angle. The legs are long and the two exterior spurs of the hind tibiæ very short, the two interior long. *Male*.—Antennæ ciliferous. *Female*.—Antennæ simple.

Larva.—Head small and elongate-globose, caudal horn rather short, nearly straight and rough. Without oblique bands, but with a row of subdorsal spots on each side. The anterior segments are much attenuated, and are capable of being withdrawn or shortened or much extended; none of the segments dilated. When disturbed they fall from their food-plants, shorten the anterior segments and bend the head toward the terminal extremity. In repose the anterior rings are merely shortened. The larval transformation takes place in a superficial cell excavated from the surface.

SPECIES.

22. LINEATA.—Thorax with six white lines.

23. GALII.—Thorax and head with a white line on the sides.

INTERMEDIA of Kirby variety of Galii?

24. OXYBAPHIA. New Sp.—The larva.

22. D. LINEATA.—*Sphinx lineata* Fabr. *Ent. Syst.* III. 1, 368, 39; *Abbott & Smith*, I. 77, pl. 39. *Sphinx Daucus* Cramer, II. 41, pl. 125, f. D. *Deilephila lineata* Harris, p. 304, 1. *Deilephila Daucus* Stephens, I. 126, 4; *Wood. Ind. Ent.* pl. 53, f. 27; *Walker*, p. 171.

Palpi white beneath. Head and thorax dark olive with a white line on each side extending to the end of tegulæ, where it is edged above slightly with blackish; two white dorsal lines and one on superior edge of the tegulæ. Abdomen greenish brown, tinged with reddish on the sides: a white dorsal line with a double row of black dorsal spots and lateral alternate white and black spots. Anterior wings deep olivaceous, with a straight buff colored band from the inner margin of the base to the tip, and its basal and apical portion whitish; the olivaceous portions of the wing are bordered and shaded with black; a white discal line and all the nervules white except the apical; a marginal bluish gray space and fringes dark buff. Posterior wings black, costa brownish, with a rose colored central band, including a white spot near the inner margin and a marginal reddish line; fingers white.

Some specimens received from *Smithsonian Institution* in Capt. Pope's collection were considerably below the average in size.

Egg. ?

Young Larva. ?

Mature Larva.—Head dark green, dotted with yellow dots. Body uniform yellowish green; a dorsal patch on first segment darker and dotted with yellowish white; a subdorsal row of elliptical spots, connected by an intermediate faint yellow line; the spots consist of two curved short black lines, enclosing superiorly an orange yellow dash, and inferiorly the yellow subdorsal line. The stigmata are reddish orange, black margined on a yellow base. Shield and terminal prolegs roughened with white dots; caudal horn yellowish orange toward extremity, and rough. Feet yellow. Length about three inches.

Pupation.—The pupa is light brown, the head case compressed laterally and prominent; tongue case not

apparent. In Pennsylvania the first brood of larvæ reach maturity about the latter part of July, and appear as imago about the middle of August. There is doubtless a second brood, but I have never seen them during Autumn. In Texas the first brood of perfect insects occurs from about March 10th to April, and there is another about the middle of July.

Food-plants.—*Portulaca oleracea* (purslane) and the turnip. I have, however, fed the larva in confinement on the leaves of the *apple tree*.

Geographical distribution.—Mexico, West Indies, Canada, entire United States, the western plains to the Rocky Mountains and California.

Measurements.

HEAD.		THORAX.		ABDOMEN.		BODY.	ANT. WING.
Length.	Breadth.	Length.	Breadth.	Length.	Breadth.	Length.	Length.
♀ 3.00	3.25—2.00	5.50	5.00	12.00	5.00	20.00	20.00
♀ 2.50	2.75—1.75	4.50	4.50	9.75	4.50	16.50	16.50
♂ 2.00	2.50—1.50	4.25	3.25	9.00	4.00	15.50	15.50

Mr. Walker regards the following species as the *Galii* of Europe. As I have never seen the European representative, and as the figures of the latter are not always identical, I am constrained to accept his conclusion, which I have no doubt is a correct one.

23. *D. GALII*.—*Sphinx Epilobii Harris*, *Cat.* 530 (1833); 2d ed. 591 (1835). *D. Chamænerii Harris*, p. 305; *Agassiz Lake Sup.* 387, pl. 7, f. 2. *D. Galii, Walker*, p. 166. *Deilephila intermedia Kirby*, IV. p. 302?

Palpi beneath whitish. Head and thorax olive brown, with a white line on the sides, margined on the tegulæ above with blackish. Abdomen brownish olive, with small dorsal white spots, with two lateral alternate white and black patches on the sides at the base, fourth segment immaculate and fifth and sixth white spotted. Beneath, the thorax is testaceous and the abdomen dark brownish with white lines on the hind portions of the segments. Anterior wings deep olivaceous, with a buff colored band from the inner margin of the base to the tip, sinuous posteriorly and irregularly indented before; a black patch at the base and one at the origin of disco-central nervule, with an indistinct whitish discal spot. The terminal margin dull brown and black, margined before; fringes brown. Posterior wings black, with a rose colored central band, deepening toward the inner margin and including a white spot; the hind margin is indistinctly marked with reddish and the fringes white.

Collections of Messrs. Edward Norton, S. H. Scudder and A. J. Packard, Jr.

Egg. ?

Young Larva. ?

Mature Larva.—Green, somewhat bronzed, dull red beneath; with nine round cream colored spots encircled with black on each side, and a dull red caudal horn. *Harris*.

Pupation. ?

Food plants.—*Epilobium angustifolium* (great willow-herb.)

Geographical distribution.—Europe, England, Canada, United States.

Measurements—a Male.

HEAD.		THORAX.		ABDOMEN.		BODY.	ANT. WING.
Length.	Breadth.	Length.	Breadth.	Length.	Breadth.	Length.	Length.
2.00	2.50—1.50	14.25	3.75	7.00	4.00	14.00	14.00

The following is a description of a larva, found on the *Oxybaphus nyctagenus*. This, I think, can scarcely be the food-plant of the insect in the larval state, since it is an exotic. The larva was full grown when found, and died in the pupa.

24. D. OXYBAPHI.

Head brown, mixed with greenish and dotted with paler dots. Body blackish green, with a narrow, vascular, yellowish green line, and a row of subdorsal round spots of the same hue on the anterior portion of each segment, the posterior half of each being marked on the wrinkles with transverse bands of numerous greenish yellow dots, those aligned with the subdorsal spots being somewhat more developed than the remainder. These bands of dots extend nearly to the dorsum, but are obsolete on the anterior portion of each ring, giving the body the appearance of being obliquely and broadly banded with the general hue. A substigmatal, interrupted, greenish yellow line, having a reddish tinge beneath the stigmata, and bordered above and below with black lines. Horn pale brown, and the cervical plate of the same hue mixed with greenish; plates of the shield and prolegs pale brown. Stigmata reddish orange; prolegs and feet pale brown. Ventral surface yellowish green, marked with black lines. Length from 3 to 3½ inches.

This larva was brought to me on October 9th, 1858, and began to prepare for pupation the same day.

PERGESA *Walker*.

"Body moderately stout. Proboscis long. Palpi as usual. Antennæ slender, rather longer than the thorax. Abdomen oblongate, more than twice the length of the thorax. Legs long, slender; hind tibiae with four long spurs. Wings rather long, moderately broad, very slightly denticulated along the exterior border. Fore wings hardly convex in front, acuminate; exterior border rather oblique, very slightly undulating, its fore part very slightly concave. Hind wings rounded at the tips."

In the European *Porcellus* the head is free, short, obtuse and broad. The body short and stout. The palpi project beyond the clypeus; the eyes are quite small but salient; the tongue scarcely as long as the body; the antennæ rather clavato-prismatic, with a short hook and seta. The thorax is short and obtuse in front. The length of the anterior wings about equal to that of the body, and are a little more than twice longer than broad across the inner angle. The hind margin of the posterior wings is slightly wavy. The individuals were formerly part of the genus *Chærocampa*.

Larva.—Smooth, anterior segments retractile, with ocellated spots on the sides of the fifth and sixth, and *without a caudal horn*.

25. P. THORATES.—Sphinx Thorates, *Hübner Ex. Schmett*, f. 525, 526. P. Thorates *Walker*, p. 151.

Green, testaceous beneath. Head and thorax with a white line on each side. Thorax and abdomen somewhat golden-hued on the sides. Abdomen rufo-fawn color, with green along the dorsum toward the base, and a row of yellow dorsal dots. Anterior wings with interrupted whitish bands curving from inner margin to costa, and tinged with rufescent; with brown lines at base of the nervules, and a greenish

patch over the middle of median nervules, with a pale brown apical patch above it; marginal space rufo-brownish. Posterior wings blackish at base, with a broad, median, luteous band, and a brown marginal band.

Var. β . *Male*. Fawn-color; anterior wings gray and brown mixed, with a silvery discal spot. Posterior luteous, interrupted with ferruginous along exterior margin.

Var. γ *Female*. Anterior wings rufescent, banded with gray and brown mixed.

Geographical distribution.—Mexico, West Indies.

Except in ornamentation this insect must approach *Chærocampa* very closely.

DARAPSA Walker.

Size moderate, body rather slender and tapering. The head is small, narrow and almost sessile; the vertex subtufted, front vertical; the eyes small; the palpi short and rather slender; the tongue about *one-half* as long as the body; the antennæ a little longer than the thorax, slender and almost filiform, with a long hook without seta. The thorax is rather short, almost globosely rounded in front. The abdomen oblanceolate, thrice as long as the thorax. The anterior wings are as long, or somewhat longer than the body, twice and a half longer than broad across the interior angle; the tips acuminate, the hind margin excavated rather deeply from beneath the tip to medio-superior vein, and thence convex to the interior angle; the inner margin deeply concave above interior angle. Posterior wings with tips rather pointed and hind margin somewhat excavated before the interior angle. *Male*.—Antennæ prismatic and ciliferous. *Female*.—Antennæ slender and almost filiform.

Larva.—Head very small and elongate-globose. The body tapers suddenly to the head, from the anterior portion of the third segment, which, together with the fourth and fifth, are much swollen. The anterior rings are retractile within the fourth. A caudal horn on the eleventh segment. It is ornamented with a subdorsal line and irregularly oval lateral patches. The larval transformation takes place on the surface of the ground in an imperfect cocoon, consisting of vegetable debris united by silken threads.

During the day the larva conceals itself beneath a leaf, stretching out the body on the midrib.

SPECIES.

§ *Hind wings ferruginous.*

26. *Chærilus*.—Fawn-color, with ferruginous shades.

27. *Myron*.—Dull pale green, mixed with dark green.

29. *Versicolor*.—Anterior wings with olive green and whitish bands curving from base to the costa.

§§ *Hind wings red.*

28. *Pholus*.—Rufescent; anterior wings blackish brown.

§§§ *Hind wings blackish.*

30. *Rhodocera*.—Fawn-color; anterior wings with a cinereous tinge.

26. D. CHÆRILUS.—*Sphinx Chærilus Cramer*, III. 91, pl. 247, f. A. *Sphinx Azaleæ Abbot & Smith*, I. 53, pl. 27. *Chærocampa Chærilus Harris*, p. 302, 2. *Darapsa Chærilus Walker*, p. 183.

Head, palpi and thorax ferruginous brown, with a spot at the base of anterior wings, and tegulæ behind tipped with brownish grey. The abdomen fawn color, with the hairs of the hind portions of segments whitish. The anterior wings are fawn color, tinged with reddish from the base to the middle; a broad ferruginous brown shade crossing the nervules, and composed of three lines having between them two rows of indistinct, fawn colored spots; marginal space grayish at the tip, and obscure purplish toward the interior angle; a ferruginous brown line across the middle of the disc, and another, rather indistinct, near the base. Posterior wings ferruginous, deepening to a ferruginous brown narrow border, on the excavated portion of the hind margin; fringes whitish.

From collections of Messrs. Edward Norton and S. H. Scudder.

Egg. ?

Young Larva. ?

Mature Larva.—Head green, with a narrow, central brownish line. Body green, deepening on the sides and whitish on the dorsal region, with six oblique, irregularly oval lateral whitish bands; stigmata orange; horn bluish green. A variety is represented by Abbot & Smith in which the green color is replaced by pale ferruginous and the bands the same; horn dark brown. (*Abbot & Smith.*)

Pupation.—Undergoes the larval transformation in an imperfect cocoon on the surface of the ground. Abbot & Smith represent, that in Georgia the first brood enter the pupa state about the middle of May and appear as perfect insects during the middle of June; another became a pupa September 16th and an imago on April 16th following.

Food-plants.—*Azalea nudiflora*, (*Pinxter flower.*) *Abbot.*

Geographical distribution.—Georgia, Massachusetts, Connecticut, New York.

Measurements—a Female.

HEAD.		THORAX.		ABDOMEN.		BODY.	ANT. WING.
Length.	Breadth.	Length.	Breadth.	Length.	Breadth.	Length.	Length.
1.50	2.25—1.50	3.25	3.50	9.00	4.00	14.00	15.00

27. D. MYRON.—*Sphinx Myron Cramer*, III. 91, pl. 247, f. C. *Sphinx Pampinatrix Abbot & Smith*, I. 55, pl. 28. *Otus Cnotus Hübn. Zütr. Exot. Schmett*, f. 321, 322. *Chærocampa Pampinatrix, Harris*, p. 301, 1. *Darapsa Myron Walker*, p. 183.

Head, palpi, prothorax and tegulæ dull dark green; a whitish patch at the base of anterior wings, the tegulæ beneath edged with whitish and a triangular whitish line on dorsum of thorax. Abdomen dull greenish. Anterior wings dull pale green from the base to about the middle, with discal spot and a moderate band across the middle of disc dark green; a broad dark green shade across the nervules, divided in the middle by an indistinct lighter line, and deeply excavated posteriorly, where there is a dull greenish cinereous marginal patch. Posterior wings ferruginous, with a dusky green patch near the interior angle.

Egg. ?

Young Larva. ?

Mature Larva.—Head pale green, with an indistinct, lateral yellowish line. Body pale green, inclining to yellowish and deepening in color beneath the subdorsal lines, which are greenish white, and curve on the sides from first segment to base of caudal horn, with seven irregularly oval, greenish white patches enclosing orange colored stigmata and bordered beneath with dark green. There are several small crimson vascular spots on the dorsum. Sometimes reddish brown, and the subdorsal lines and lateral patches tinged with reddish. Horn reddish brown, with black tubercles.

Pupation.—Transforms on the surface in an imperfect cocoon. *Pupa* luteous with the wing cases brown and dotted with lines of black dots; eye cases black; abdomen with the incisions between the segments black and round black lateral spots. The fall brood of larvæ enter the pupa state from the latter part of August to the middle of September.

Geographical distribution.—Pennsylvania, Massachusetts, Georgia, New York.

Measurements.

HEAD.		THORAX.		ABDOMEN.		BODY.	ANT. WING.
Length.	Breadth.	Length.	Breadth.	Length.	Breadth.	Length.	Length.
1.75	2.25—1.50	3.00	3.50	9.00	3.00	13.00	13.00

28. D. PHOLUS.—Sphinx Pholus Cramer, I. 137, pl. 87, f. B; *Fabr. Sp. Ins.* II. 143, 20; *Mant. Ins.* II. 94, 23; *Ent. Syst.* III. 1, 363, 24; *Gmel. Syst. Nat.* I. 5, 2376, 65. Darapsa Pholus Walker, p. 184.

Rufescent. Fore wings blackish brown, with a gray triangular discal patch; a fawn colored patch on the median nervules and a red submarginal line, with two marginal brown bands, one arising on the costa at about the origin of post-apical vein, and the other near the margin itself. Posterior wings red, paler towards the base.

Geographical distribution.—West Indies.

Tongue scarcely one-half as long as the body. Anterior wings excavated behind the tip.

29. D. VERSICOLOR.—Chærocampa versicolor Harris, p. 303, 3.

Pale green varied with olive and whitish. A white line on each side of the head, a dorsal white line, tinged with reddish and extending from the head to the tip of the abdomen; prothorax and edges of tegulæ above and beneath margined by white lines. A metathoracic spot on each side, and the middle of the abdominal segments tinged with dark buff, with the hind margins of the segments dark green from the base to the middle and thence to the tip reddish brown. Anterior wings slightly ferruginous at the base, with narrow olive green and dull white bands, the latter slightly tinged with ferruginous, arising at the inner margin of the base and curving to the costa from the basal portion of the disc to beyond the origin of post-apical nervule; an oblique whitish apical line with an olive green patch adjoining and before it, in the post-apical interspace, and the line edged with olive green in the apical interspace. Hind wings rust colored, with an indistinct, greenish terminal margin. *Under surface* of anterior wings pale sulphureous; toward the base pale ferruginous, with an olive streak along the costa from the base widening toward the tip. Posterior wings olive green powdered with white at the base.

Described from a colored figure by the late Dr. Harris, and partly by Mr. Scudder from the specimen in his collection.

Egg. ?

Young Larva. ?

Mature Larva. ?

Pupation. ?

Food-plants. ?

Geographical distribution.—Massachusetts.

GROUP II.

Proboscis moderately long. Wings long, rather narrow. Fore wings slightly acuminate, convex in front toward the tips; exterior border slightly convex, very oblique; interior border slightly concave from half its length to the interior angle. Hind wings hardly acuminate.

30. *D. RHODOCERA*.—*Walker*, p. 184.

Fawn color, paler beneath. Sides of the head and of the thorax whitish. Antennæ rose color above. Abdomen paler than the thorax, with a blackish spot on each side at the base. Fore wings with a cinereous tinge, with an oblique exterior line, with a brownish discal dot, and with two diffuse ferruginous spots, one in front, the other behind; ciliæ ferruginous. Hind wings blackish, whitish about the interior angle; ciliæ mostly whitish. Length of the body 17 lines; of the wings 36 lines.

Geographical distribution.—St. Domingo.

CHÆROCAMPA *Dup.*

The body in this group is slender, long and tapering. The thorax is smooth, rather short, advanced in front of the base of the anterior wings and tapers on the sides to the head. The head is rather large, prominent and moderately broad; the front smooth, conical and broad; the eyes moderate and salient; the palpi ascending to a level with the front; the tongue extends to the end of the abdomen; the antennæ are short, but longer than the thorax, clavato-prismatic, terminating suddenly in a short hook and seta. The abdomen is quite long, more than twice longer than thorax, oblanceolate, tapering very much to the tip, which is acute. The wings are narrow, the anterior three times longer than broad across the inner angle, and the length much less than that of the body; the tip very acute, the hind border very oblique and nearly straight or slightly excavated beneath the tip. Hind wings, the tip somewhat acuminate, hind border very oblique, and interior angle well marked. The legs are long and slender, the anterior tibiæ hairy, and hind tibiæ with four moderate spurs.

Larva.—The head is small and the anterior segments very much attenuated from the third, and retractile; third and fourth swollen, with a large subdorsal ocellus on the latter, followed by a row of ocelli, similar; eleventh segment with a caudal horn (*Abbot & Smith*). The larval transformation takes place in an imperfect cocoon spun on the surface of the ground.

SPECIES.

§ Hind border of anterior wings nearly straight.

31. *Tersa*.—Hind wings black, with a row of subterminal yellow spots.

32. *Chiron*.—Hind wings black, with a band of pale yellow dots; fore wings without distinct lines.

35. *Procne*. New sp.—Hind wings uniform blackish brown.

38. *Versuta*. New sp.—Hind wings dark brown, dull greenish at base, with an irregular central luteous band, tinged with orange.

§§ Hind border of anterior wings somewhat hooked.

34. *Falco*.—Hind wings with two blackish stripes.

36. *Drancus*.—Hind wings uniform dark brown.

37. *Nitidula*. New sp.—Hind wings black, with a row of central, pale testaceous spots and terminal border the same; fore wings with a single line.

33. *Thalassina*. New sp.—Hind wings black with a central, dull greenish band.

31. C. TERSA.—*Sphinx Tersa Drury*, I. 61, 28, f. 3. *Cramer*, IV. 226, pl. 397, f. C. *Fabr. Sp. Ins.* II. 153, 59; *Mant. Ins.* II. 98, 65; *Ent. Syst.* III. 1. *Gmel. Syst. Nat.* I. 5, 2379, 71. *Abbot & Smith*, I. 75, pl. 38. *Theretra Tersa Hübner*, 135, 1449. *Chærocampa Tersa Harris*, p. 303, 4. *Metopsilus Tersa Duncan*, *Nat. Libr.* 36, pl. 5, f. 1; pl. 6, f. 1.

Palpi pale ferruginous beneath; head and thorax brownish olive, with a lateral whitish line inclining to roseate on the sides; tegulæ slightly edged above with ferruginous. Abdomen with a broad, dorsal, dusky band, containing five indistinct darker lines and lateral band on each side, rusty yellow. Anterior wings greenish brown, slightly glaucous toward the base, with a minute discal spot, dark brown, and with numerous oblique, alternate, dark brown and yellowish lines, extending from near the base and middle of inner margin to the tip, with a straight, brownish, submarginal line. Posterior wings black, with a row of subterminal yellow spots.

From the Smithsonian Institution. Capt. Pope's Collection in Texas.

Egg. ?

Young Larva. ?

Mature Larva.—Light green, with a large, subdorsal, crimson ocellus on the fourth segment, containing a blue ring and edged with black and white rings, with six others smaller and similar, placed on a white subdorsal line, which begins on the second segment and extends to the crimson caudal horn. The dorsum is dashed with brown points; stigmata yellow dotted with black points above and below. (*Abbot & Smith.*)

Pupation. ?

Food-plants. ?

Geographical distribution.—S. America, Mexico, W. Indies, Southern States, Illinois, Ohio.

Measurements.

HEAD.		THORAX.		ABDOMEN.		BODY.	ANT. WING.
Length.	Breadth.	Length.	Breadth.	Length.	Breadth.	Length.	Length.
2.50	2.75—1.75	3.50	3.50	13.00	4.00	19.00	15.00.

32. C. CHIRON.—*Sphinx Chiron Drury*, I. 56, pl. 26, f. 3. *Sphinx Nechus Cramer*, II. 125, pl. 178, f. B. *Fabr. Sp. Ins.* II. 152, 56; *Mant. Ins.* II. 98, 61; *Ent. Syst.* III. 1, 377, 63; *Gmel. Syst. Nat.* I. 5, 2384, 89. *Theretra Nechus Hübner*, 135, 1447. *Chærocampa Chiron Walker*, p. 132.

Green, sometimes ferruginous fawn-color; a line on the sides of head and thorax and body beneath whitish testaceous. Fore wings dark green; with a pale yellow streak at the base of the inner margin, and an irregular, oblique brown, or testaceous band traversing the lower part of the nervules, enlarging toward the inner margin and extended above on it as a line. Posterior wings black, with a band of pale yellow spots. Abdomen green, slightly gilded on the sides, with a double row of black dorsal dots. Legs very long.

Geographical distribution.—S. America, Mexico, West Indies.

§§ *Anterior wings excavated behind the tip and rounded in the middle.*

33. C. THALASSINA.

Head and thorax with a greenish white line on the sides and a greenish white dorsal line on the front of the thorax. Head and thorax dark brownish green, disc testaceous brown. Abdomen brown, dark brownish green on the sides toward the base, with a double row of dark brown dorsal spots. Anterior wings with a pale yellowish streak on the inner margin near the base, whence proceeds to the tip a line of the same hue, terminating in a large yellowish costo-apical patch. On the costal side of this line, the wing is greenish, somewhat dark brownish on the costa, and towards its terminal sides, deep olivaceous, with a

sub-terminal row of dark brown dots on the nervules; discal spot black. Hind wings black with a central median dull greenish band.

Collection of the Acad. Nat. Sciences, Philadelphia.

Geographical distribution.

?

§§ *Fore wings very acute and somewhat hooked.*

34. C. FALCO.—Walker, p. 132.

Fawn colored, whitish testaceous beneath. Head and thorax with a whitish stripe along each side. Disk of the thorax cinereous brown. Abdomen brown, with a fawn-colored stripe along each side, and a double dorsal whitish line. Fore wings with blackish speckles, with a blackish discal dot and with several blackish, slightly oblique, posterior lines, slightly hooked and more acute at the tips than in the other species of this genus. Hind wings with two blackish stripes; exterior border slightly emarginate. Length of the body 15—19 lines; of the wings 30—40 lines.

Geographical distribution.—Mexico.

§ *Hind border of anterior wings nearly straight.*

35. C. PROCNE.

Head and thorax dull brown, (if not faded,) with a broad whitish stripe on the sides, extended to the lower edge of tegulæ. Abdomen brownish testaceous, with faint dark brown dorsal marks in atoms. Anterior wings rather pale brownish, punctated with dark atoms and with obscure dark brown lines extending from the base to the tip; discal spot dark brown and small. Posterior wings uniform blackish brown. Under surface of the wings brownish, somewhat tinged with rufous, and with two rows of brown spots in the middle of the posterior.

Collection of the Acad. Nat. Sciences, Philadelphia.

Geographical distribution.—California.

§§ *Fore wings very acute and somewhat hooked.*

36. C. DRANCUS.—Sphinx Drancus Cramer II. 56, pl. 132, f. F. Xylophanes Drancus Hübner, Verz. Schmett, 136, 1460. Chærocampa Drancus Walker, p. 133.

Blackish brown; sides of head and thorax with a white line, and a white dorsal line extending from the head to tip of the abdomen; tegulæ edged above with reddish brown, beneath with white. The base of abdomen with two reddish brown bands. Anterior wings blackish brown, discal spot black; several lines extending from the inner margin to the tip, three of which in the middle of the wing arise from a blackish patch on the inner margin placed on a fawn-colored ground and a single black, subterminal line placed between two dark brown lines. Posterior wings uniform dark brown. (*Cramer's figure.*)

Geographical distribution.—West Indies.

§§ *Anterior wings acute and somewhat hooked.*

The following species resembles in some respects Mr. Walker's *Crotonis*, but I think it is not the same.

37. C. NITIDULA.

Head and thorax with a rufo-whitish line on each side. Head and anterior portion of tegulæ dark brown, tinged with greenish, with the disc brown. Abdomen brown, paler on the sides, with a double row of dorsal dark brown dots and a black patch on the sides at the base. Anterior wings dull greenish brown, with a large black spot on the inner margin near the base; discal spot small and black; a single brownish line from the inner margin to the tip; with two rows of indistinct brownish dots on the nervules

before it, and a more decided row behind, near the posterior margin. Posterior wings black, with a row of central, pale testaceous, triangular spots, and a narrow terminal border of the same hue.

Undersurface of the wings, disc of the anterior blackish, and thence rufescent brown; posterior wings rufescent brown, with two lines of dark brown dots.

Collection of Acad. Nat. Sciences, Philadelphia.

Geographical distribution.—Mexico.

§ *Hind border of anterior wings nearly straight.*

38. C. VERSUTA.

Head and thorax brown. Abdomen brown, with black rings between the basal segments and a black spot on each side of the basal segment. Anterior wings brown with a faint wavy line and narrow band across the middle of the disc, somewhat deeper brown; discal spot small and dark brown; an oblique brownish band extending from the origin of subcosto-inferior vein toward the inner angle, followed by two short lines of the same hue; a blackish brown, irregular, wavy line, extending from the costa near the origin of the post-apical vein to inner margin above the angle, and another of the same hue joining it by an angle on the disco-central vein, and extended very irregularly from near the tip to the inner angle, and shaded toward the hind margin of the wing with dark brownish. Posterior wings dark brown, dull greenish at the base, with an irregular, central, luteous band, tinged with orange.

Collection Acad. Nat. Sciences, Philadelphia.

Geographical distribution.—Mexico.

AMBULYX *Boisd.*

Body rather slender or hardly stout. Head prominent, conical, obtuse. Proboscis long. Antennæ minutely serrated. Abdomen long, oblanceolate. Legs slender; hind tibiæ with four very long spurs. Wings narrow and very long, especially in the typical species, *A. strigilis*. Fore wings slightly curved in front toward the tips, which are acuminate; exterior border excavated by the tip, nearly straight, and extremely oblique from thence to the interior angle, where the interior border forms an inward curve; second inferior vein (*superior*) nearly twice further from the third (*posterior*) than from the first, (*disco-central*); third more than twice further from the fourth than from the second. Hind wings somewhat emarginate along the exterior border. *Walker*.

SPECIES.

40. *Strigilis*.—Hind wings luteous or pale orange, with three angulated, central, brown lines.

41. *Ganascus*.—Hind wings roseate, with a central and two subterminal, blackish brown bands.

40. *A. STRIGILIS*.—*Sphinx strigilis* *Linn. Mant.* I. 538. *Drury*, I. 62, pl. 28, f. 4. *Cramer*, II. 14, pl. 106, f. B. *Fabr. Sp. Ins.* II. 144, 22; *Mant. Ins.* II. 95, 25; *Ent. Syst.* III. 1, 364, 26. *Gmel. Syst. Nat.* I. 5, 2377, 66. *Pholus strigilis* *Hübner Verz. Schmett.* 134, 1437. *Ambulyx strigilis* *Walker*, p. 121.

Pale fawn-color, luteous beneath. Head with a furcate ferruginous brown spot between the antennæ and thorax, with two large lateral patches of the same hue. Antennæ white. Abdomen with a brown dorsal line and oblique brown lateral streaks, edged with testaceous. Anterior wings fawn-color, with separated, oblique ferruginous streaks on the costa, four abbreviated, wavy blackish brown lines crossing

the middle of the nervules, a few spots on the inner margin, and a marginal black line (bordered above in Cramer's figure with blue.) Posterior wings luteous or pale orange, with three angulated brownish lines and brownish terminal margin.

Geographical distribution.—South America, West Indies.

41. A. GANASCUS.—Sphinx Ganascus *Stoll, Cramer, V. 157, pl. 35, f. 3.* Amblypterus Ganascus *Hübner, Verz. Schmett. 133, 1429.* Ambulyx Ganascus, *Walker, p. 121.*

Fawn-color; head with a band between the antennæ, the tegulæ and a band at the base of the abdomen dark greenish brown. The antennæ white. Abdomen fawn-color, with brown or ferruginous dorsal spots. Anterior wings brown, with a glaucous hue; a rectangular spot on the base of the inner margin dark greenish brown, edged with testaceous; a small round one at the base, two in the disc, another near the tip on costa, one in medio-posterior interspace and a small one above the interior angle of the same huc and edged with greenish. Posterior roseate, with three angulated blackish brown bands sometimes dilated and somewhat connected.

Geographical distribution.—South America, Mexico, West Indies.

PHILAMPELUS *Harris.*

The body is large and thick. The head rather large, free and prominent, with the front long, smooth, conical and rather broad; the eyes large or moderate; the palpi ascending and pressed closely to the front; the tongue as long as the body; the antennæ long, exceeding the thorax, slender and tapering at the extremity into an ample hook with seta. The thorax is thick, moderately advanced in front of the base of anterior wings and rounded. The abdomen large, thick, cylindrico-conical and acute at the tip, more than twice the length of the thorax. The wings are moderately long; the length of the anterior somewhat more than that of the body, and about twice and a half longer than broad across the inner angle; the hind border entire, slightly excavated from the tip to medio-superior vein, and thence convex to interior angle, or very oblique and almost straight, with the inner margin deeply concave. The posterior are somewhat acuminate at the tips and the hind margin slightly excavated before the inner angle. The legs are long but strong, and the hind tibiæ with two short and two long spurs. *Male.*—Antennæ ciliferous. *Female.*—Antennæ simple.

Larva.—The head is small and globose, and the segments of the body anterior to the fourth much attenuated to the head; these and the head are capable of being retracted within the fourth, which is much swollen. Instead of a caudal horn on the eleventh segment there is a shining lenticular tubercle, and the body at this part is rounded, and descends very abruptly to the anal shield. It is ornamented with irregularly oval, stigmal patches and a faint subdorsal line.

In repose, or when disturbed, the anterior rings are retracted within the fourth, causing it to appear truncated and bulbous anteriorly, and at the same time the body is thrown into a sphinx-like posture. The larval transformation is subterranean.

The pupa is cylindrico-conical; head-case distinct and prominent; tongue-case not apparent.

SPECIES.

§ Eyes moderate. Fore wings with hind margin slightly sinuous or undulating.

42. *Satellititia*.—Hind wings pale green, with a large round black patch and black subterminal demi-band.
Pandorus.—A variety of *Satellititia*.

43. *Achemon*.—Hind wings pink, with a subterminal row of ferruginous brown spots.

44. *Typhon*.—Hind wings red, with a denticulated black band varied with glaucescent; exterior margin brown.

45. *Labruscæ*.—Hind wings blue, varied with black and red; exterior margin greenish.

§§ Eyes large. Fore wings with hind margin almost straight, or very slightly sinuous.

46. *Vitis*.—Olivaceous green; hind wings pale green, towards the inner margin rose-red.

Hornbeckiana.—A variety of *Vitis*.

47. *Jussieuæ*.

§ Eyes moderate. Fore wings undulating.

42. P. SATELLITIA.—Sphinx *Satellititia* Linn. *Mant.* I. 539; *Drury*, I. 63, pl. 29, f. 1, 2; *Fabr. Sp. Ins.* II. 148, 36; *Mant. Ins.* II. 96, 40; *Ent. Syst.* III. 1, 370, 42; *Gmel. Syst. Nat.* I. 5, 2381, 74. Sphinx *Lycaon* Cramer I. 156, pl. 55, f. A. *Pholus Lycaon* Hübner, *Band.* 2, *Lep.* II., *Sphing.* III., *Leg.* II., *Eumorph.* A., *Eleg.* 2. *Philampelus Satellitia* Harris, p. 299, 2; *Walker*, p. 175. *Daphnis Pandorus* Hübner, *Exot. Schmett. Lep.* II., *Sphing.* III., *Leg.* II., *Eumorph.* A., *Eleg.* 2. *Philampelus Pandorus* Walker, p. 174.

Mr. Walker's description applies, I suppose, to South American species, which are much darker in color than ours. The description of *Pandorus* corresponds very nearly with the *Satellititia* of Harris, who never described in the 36th vol. of the American Journal of Sciences or elsewhere, to my knowledge, another closely allied perfect individual under the specific name *Ampelophaga*. Mr. Walker's citation is erroneous.

Head, tips of the palpi and middle of thorax pale green, basal articles of palpi brownish; tegulæ dark olive, forming a triangular patch; a dorsal line on prothorax and two metathoracic patches dark olive. Abdomen pale brownish tinged with green, with a dark olive patch on dorsum at the base and a lateral blackish patch on each side. Anterior wings pale green, with deep olive shades; a sub-median nearly square patch on inner margin, with a shade extending to the base, a patch above the interior angle, with a spot in the medio-posterior interspace separated from it by the nervule, and almost bordered by a faint line which is angulated on the medio-central, a sub-apical patch and a broad disco-median shade, all deep olive; a double blackish discal spot. The medio-central and posterior nervules and the space between the patches on the inner margin, tinged with roseate; a few olive-colored dashes across the disc and two lines of the same hue, sometimes faint, crossing the nervules from the hind portion of sub-median patch. Posterior wings pale green, with a large, round black patch toward the middle of inner margin, and a broad sub-terminal black demi-band terminating in blackish lines and a row of spots toward inner margin, on a roseate ground.

Egg.

?

Young Larva.

?

Mature Larva.—Head green. Body pale green on dorsum, deepening on the sides, with minute dark

green rings, which become on the dorsum dark green dots. Six short, irregularly oval patches on the sides, margined with a black line, enclosing the stigmata, which are bordered with pale crimson. The lenticular tubercle black and contained in a yellow patch bordered with black.

Pupation. ?

Food-plants.—Indigenous and exotic grape vines and *Ampelopsis*.

Geographical distribution.—South America, Mexico, West Indies, United States.

Measurements—a Female.

HEAD.		THORAX.		ABDOMEN.		BODY.	ANT. WING.
Length.	Breadth.	Length.	Breadth.	Length.	Breadth.	Length.	Length.
3.00	3.50—2.50	6.00	5.00	13.00	5.50	22.00	23.00

43. P. ACHEMON.—Sphinx Achemon *Drury*, II. 51, pl. 29, f. 1. Sphinx Crantor *Cramer*, II. 11, pl. 104, f. A.; *Fabr. Sp. Ins.* II. 151, 51; *Mant. Ins.* II. 97, 55; *Ent. Syst.* III. 1, 375, 58; *Gmel.* I. 5, 2380, 73; *Abbot & Smith*, I. 81, pl. 41. Pholus Crantor *Hübner*, *Verz. Schmett.* 134, 1435. Philampelus Achemon *Harris*, p. 300, 3.

The head, tips of the palpi and disc of the thorax fawn-color with a grayish hue: basal articles of the palpi dark reddish brown; tegulae deep ferruginous brown, forming a triangular patch margined with whitish. The abdomen pale reddish brown with a cupreous lustre, and the hind portions of the segments tipped with white. Anterior wings dusky fawn-color, sometimes pale fawn-color, with a ferruginous brown dot at the base, a square sub-median patch on the inner margin, a patch above the inner angle divided toward its apex by the medio-posterior nervule and a large sub-apical patch, ferruginous brown; from the sub-median patch two faint brown lines are thrown off posteriorly to the costa, the most exterior being angulated on the medio-central vein, and from its anterior portion are two other diverging brownish lines, with a faint line above them near the base of the wing; the disco-median shade is rather faint and brownish. The posterior wings are pink, deepening in intensity toward the middle of inner margin, and above the interior angle is a reddish brown streak; a subterminal row of ferruginous brown spots from the middle to the interior angle and a broad dusky terminal band. The undersurface of the wings is roseate.

Egg. ?

Young Larva.—Green, with yellow lateral stripes edged with black and a long recurved, slender reddish horn.

Mature Larva.—Head reddish brown. Body pale reddish brown on the dorsum, with a darker vascular line and pale reddish subdorsal line on each side and the general color deepened laterally. Six lateral, short, irregularly oval white patches bordered with black, containing the stigmata. The anterior rings are dotted with blackish. The lenticular tubercle is black and contained in a brown patch edged with adjacent black and white lines.

Pupation. ?

Food-plants.—The grape.

Geographical distribution.—New York, Pennsylvania.

Measurements—a Female.

HEAD.		THORAX.		ABDOMEN.		BODY.	ANT. WING.
Length.	Breadth.	Length.	Breadth.	Length.	Breadth.	Length.	Length.
3.00	2.00	6.00	6.00	13.00	6.00	22.00	24.00

44. P. TYPHON.—Sphinx Typhon *Klug*, *Neue Schmett.* pl. 3, f. 1. Philampelus Typhon *Walker*, p. 177.

Cinereous, reddish beneath. Palpi red. Thorax with two dark brown abbreviated stripes. Abdomen with dark brown bands, red on the sides. Anterior wings glaucescent and testaceous mixed, with several blackish brown sub-trigonal patches. Posterior wings red, with a denticulated black band varied with glaucescent, with the exterior margin brown and the cilia white.

Closely allied to *P. Achemon*.

Geographical distribution.—Mexico.

45. *P. LABRUSCÆ*.— — — — *Madam Merian*, *Ins. Surin.* pl. 34. *Sphinx Labruscæ* *Linn. Mus. L. Utr.* 352; *Fabr. Sp. Ins.* II. 152, 57; *Mant. Ins.* II. 98, 63; *Ent. Syst.* III. 1, 377, 66; *Clerc. Icon.* pl. 47, f. 3; *Cramer*, II. 133, pl. 184, f. A.; *Gmel. Syst. Nat.* I. 5, 2380, 14; *Swainson*, II. pl. 87. *Hübner. Exot. Schmett. Band. I., Lep. II., Sph. III., Leg. II., Eumorph. A., Eleg. A.* *Argæus Labruscæ* *Hübner. Verz. Schmett.* *Philampelus Labruscæ* *Walker*, p. 178.

Green, testaceous beneath. The abdomen sometimes and rarely the whole body and anterior wings testaceous. Abdomen with a black spot at base on each side, beneath and at sides spotted with white. Anterior wings green, with two darker bands margined with white, one of which crosses the disc and meets an oblique one on the inner margin. Posterior wings blue, with a black angulated band edged interiorly with red and a sub-terminal black band breaking into black lines toward interior angle on a reddish ground; terminal margin testaceous.

Madam Merian represents the larva without a caudal horn, the anterior segments swollen and with lateral oval spots.

Geographical distribution.—S. America, Mexico, West Indies.

§§ Eyes large. Fore wings nearly straight.

46. *P. VITIS*.— — — — *Merian*, *Ins. Surin.* pl. 47, f. 1. *Sphinx vitis* *Drury*, I. 60, pl. 28, f. 1. *Cramer*, III. 136, 138, pl. 267, f. C; pl. 268, f. 9; *Linn. Syst. Nat.* II. 801, 16; *Mus. Lud. Utr.* 354; *Wein. Schmett.* 238. *Fabr. Sp. Ins.* II. 147, 35; *Mant. Ins.* II. 96, 39; *Ent. Syst.* III. 1, 369, 41. *Gmel. Syst. Nat.* I. 5, 2380, 16. *Abbot & Smith*, I. 79, pl. 46. *Dupo vitis* *Verz. Schmett.* 137, 1466. *Philampelus vitis* *Harris*, p. 299, 1; *Duncan*, 36, p. 104, pl. 7. *Philampelus Hornbeckiana* *Harris*, p. 299, note. (?)

Head and thorax grayish tinged with greenish. Thorax with a dorsal dark olive line, tegulæ dark olive edged with white. Abdomen dark olive, paler on the sides, with a pale dorsal line; a blackish patch on the sides at base and a dark olive dorsal patch at the base. Anterior wings deep olive, with a double whitish transverse line toward the base, a pale buff colored band, (in faded specimens white or whitish,) extending from the base to the tip, crossed by another of the same hue from the lower third of inner margin to costa beyond the origin of post-apical vein and containing posteriorly a dark olive line; the nervules of the median nerve pale flesh color or whitish when faded; discal spot double and black. Posterior wings pale green, pale yellowish along the costa, with a central black line terminating in a black patch near the middle of inner margin and a sub-terminal black band tapering to interior angle; the inner margin rose red, enclosing above the interior angle a whitish spot; terminal margin cinereous.

Smithsonian Institution. From Capt. Pope's collection in Texas.

Egg.

?

Young Larva.

?

Mature Larva.—Head reddish with two black lines in front. Body flesh color mixed with yellow, and with short, transverse black lines. The lateral semi-oval bands are yellowish white, edged with black. Body beneath the stigmatae is greenish with black lines and stigmatal blackish dots on the three anterior segments; lenticular tubercle blackish with dorsal black lines. *Abbot & Smith*.

Pupation.—According to *Abbot & Smith*, it enters the pupa state August 14th, and appears as an imago September 7th. Another became a pupa September 29th, and appeared July 18th following.

Food-plants.—*Jussiaea erecta*, (*decurrens*?)

Geographical distribution.—S. America, Mexico, West Indies, Southern U. States.

Measurements—a Male.

HEAD.		THORAX.		ABDOMEN.		BOBY.	ANT. WING.
Length.	Breadth.	Length.	Breadth.	Length.	Breadth.	Length.	Length.
3.00	4.00-2.50	6.50	5.00	15.00	5.50	23.00	23.00

This species approaches *Vitis* so nearly in its ornamentation that I am much disposed to place it as a variety. But for the present, perhaps, it is better to represent it as distinct.

47. P. JUSSIEUÆ.—*Eumorpha elegans* Jussieuæ, *Hübner Exot. Schmett. Band. I., Lep. II., Sph. III., Leg. II., Eumorph. A., Eleg. a., Band. II.* Dupo Jussieuæ, *Lep. II., Sph. III., Leg. III. Deileph. A., Pallid. I.; Verz. Schmett. 137, 1467.* *Sphinx fasciatus*, *Sulz. Hist. Ins. pl. 20, f. 1.* *Philampelus Jussieuæ Walker*, p. 177.

Pale buff, tinged with reddish. Head and thorax with a dorsal olivaceous green line. Thorax with two broad olivaceous green stripes. Abdomen with two black spots at the base on the sides, and two dorsal olivaceous green stripes. Anterior wings olivaceous green, costa reddish brown, with a discal mark, a transverse streak near the base, with two connected bands along the middle and the veins pale buff; exterior margin reddish brown. Posterior wings pale green, rosy along the inner margin and exterior half of terminal border, with two black spots near the middle of inner margin, and a sub-terminal black band ending in short lines and a dusky patch at inner angle.

Geographical distribution.—S. America, West Indies, Mexico.

Collection of Acad. Nat. Sciences, Philadelphia.

PACHYLIA *Walker.*

The body is large and thick. The head is large, free and prominent; the front smooth, long, broad and elliptical: the palpi ascend to its level; the eyes are large or very large, salient and hemispherical; the tongue strong and thick, but when unrolled extends only to about the third abdominal segment; the antennæ are about as long as the thorax, with a long hook, compressed laterally. The thorax is smooth, immaculate, thick and cylindrical, well advanced in front of the base of anterior wings, and tapering on the sides to the head. The abdomen is large, nearly cylindrical or oblanceolate, generally rather more than twice the length of the thorax. The wings are about equal in length to that of the body, or somewhat longer, and about twice and a half longer than broad across the inner angle; the hind margin of the anterior entire, almost obliquely convex, but slightly excavated near the tip and above inner angle, or more decidedly excavated and rounded in the middle, with the tip acuminate; the inner margin deeply concave above inner angle. The posterior wings are suddenly curved above the tip, and the hind margin slightly denticulated,

or almost straight. The legs are strong and moderately long, the posterior tibiae having two very short external and two long internal spurs. *Male*.—Antennæ prismatic and well ciliated. *Female*.—Antennæ simple.

The specimens of the perfect insects of this genus in my possession most undoubtedly show strong affinities to that of *Philampelus*. I am at loss to conceive wherein Mr. Walker can perceive any affinity to *Macroglossa*, unless it be in *resumens* and *inconspicua*. These species I have never seen, and the generic diagnosis given above cannot, therefore, include any structural peculiarities which may characterize them.

SPECIES.

§ Hind wings with interior angle salient and covered with silvery scales.

† External margin of fore wings slightly excavated behind tip and above inner angle.

48. *Ficus*.—Greenish brown; hind wings luteous with a broad central and margined black band.

Male of Ficus?—Bright pure brown; hind wings ochraceous, with a central patch and margined band black.

† Fore wings acuminate, rather narrow and doubly excavated.

49. *Inornata*.—Hind wings concolorous dark brown.

§§ Interior angle of hind wings not salient nor covered with silvery scales.

a. Hind wings pale fawn-color.

50. *Resumens*, with a black discal stripe connected at the tip with a black marginal stripe.

51. *Inconspicua*, with two dark brown stripes, the one discal, the other marginal.

48. P. FICUS. — — — Merian, pl. 33. Sphinx Ficus Drury, II. 44, pl. 26, f. 1; Cramer, III. 88, pl. 246, f. E.; Linn. Mus. Lud. Ulr. 353; Olerck. Icon. pl. 49, f. 2; Fabr. Sp. Ins. II. 145, 16; Mant. Ins. II, 95, 29; Ent. Syst. III. 1, 366, 31. Gmel. Syst. Nat. I. 5, 2380, 15. Pholus Ficus Hübner, Verz. Schmett. 134, 1438. Pachylia Ficus Walker, p. 189.

Pale luteous brown, varied with dark brown. Head, thorax and palpi dark brown. Abdomen pale brown on the sides and between the basal segments; the two basal segments banded with blackish brown. Anterior wings luteous brown, with dark brown markings; a patch at the base and a single line nearly joining it, three wavy lines crossing the middle of the disc, a conspicuous discal spot, a patch near the origins of medio-superior and central nervules, a small patch on the inner margin beneath it, consisting of three short lines, the most posterior of which is the continuation of the upper of three separated, denticulated lines curving across the middle of the nervules. A semi-oval, apical, pale greenish brown patch, pointed on the tip and bordered beneath by a dark brown triangular shade, the tip of which reaches the medio-central nervule on the margin. Posterior wing pale luteous, with a broad central black band and a broad marginal band of the same hue tapering toward the inner margin, with an indistinct line of the same hue above it; inner angle covered with niveous scales.

Geographical distribution.—Mexico, West Indies, S. America.

Collection of W. H. Edwards and Acad. Nat. Sciences, Philadelphia.

Measurements—a Female.

HEAD.		THORAX.		ABDOMEN.		BODY.	ANT. WING.
Length.	Breadth.	Length.	Breadth.	Length.	Breadth.	Length.	Length.
3.75	—? 2.50	7.50	6.00	15.00	7.00	27.00	28.00

I think the following is the male of *Ficus*. Should the conjecture be wrong, I would propose for it the name *Lyncea*.

Bright pure brown somewhat tinged with ferruginous. Thorax with a purplish reflection. Palpi beneath white. Abdomen paler than thorax, pale yellowish on the sides and between the basal rings. Anterior wings with a paler rather broad stripe near the base containing a dark brown line and indistinct lines of the same hue crossing the middle of the disc; discal spot conspicuous, ferruginous brown, with three separated, denticulated, rather indistinct dark brown lines crossing the middle of the nervules; a semi-oval, apical, pale luteous patch, bordered beneath by a triangular ferruginous brown shade, with a pale purplish patch at the interior angle. Posterior wings ochraceous, with a central black band not extended to costa, and a marginal blackish band tapering toward the inner angle, bordered above by a series of black dots on the nervules continued as a line toward the inner margin; the inner angle covered above with niveous scales. The wings beneath ochraceous, both anterior and posterior with a row of sub-terminal blackish dots and the latter with a faint central dark line.

From the Smithsonian Institution. Capt. Pope's collection in Texas.

Measurements—a Male.

HEAD.		THORAX.		ABDOMEN.		BODY.	ANT. WING.
Length.	Breadth.	Length.	Breadth.	Length.	Breadth.	Length.	Length.
4.00	4.25—2.75	9.50	6.00	17.50	6.00	28.50	26.00

Anterior wings rather narrower than the preceding, more pointed at the tip and the hind border more distinctly sinuous.

49. *P. INORNATA*.—*Sphinx Ficus Cramer*, IV. 216, pl. 394, f. D. *Pachylia Ficus Walker*, p. 189.

Dull greenish brown or dark reddish brown. Abdomen rusty brown on the sides. Anterior wings in the ♀ with an olivaceous hue toward the base and somewhat purplish posteriorly. A pale brownish nearly semi-circular patch on the middle of costa extending beneath to the medio-superior and behind to the post-apical nervule; this is bordered by a broad umber brown band, which sends off to the middle of inner margin a short band of the same hue. There is only one distinct denticulated umber brown line crossing the middle of the nervules, and is sometimes obsolete. A semi-oval, apical pale brown patch, tinged with dull greenish and bordered beneath by a triangular umber brown shade. Posterior wings nearly concolorous umber brown, or deep reddish brown, deepened to an obscure marginal blackish band. The inner angle curved above with niveous scales.

From collection of W. H. Edwards and Acad. Nat. Sciences of Philadelphia.

Honduras and Brazil.

Measurements—a Female.

HEAD.		THORAX.		ABDOMEN.		BODY.	ANT. WING.
Length.	Breadth.	Length.	Breadth.	Length.	Breadth.	Length.	Length.
2.75	4.00—2.50	7.50	6.00	12.00	6.50	22.00	26.00

50. *P. RESUMENS*.—*Walker*, p. 190.

Fawn color, paler beneath. Abdomen with a black band on each of the three basal segments; the four following segments with two black spots on each. Fore wings with several undulating transverse brown lines, with a brown discal dot and with three brown dots near the interior angle; exterior border cinereous. Hind wings paler, with a black discal stripe, which is connected at the tip of the wings with a black marginal stripe. Length of the body 17—18 lines; of the wings 40—42 lines.

Var. β.—Cinereous brown. Hind wings dull pale fawn color, greenish toward the base.
S. America, Honduras, West Indies.

51. *P. INCONSPICUA.*—*Walker*, p. 190.

Fawn-color, testaceous beneath. Abdomen with two rows of black dots, and toward the base with two interrupted black bands. Fore wings with three undulating oblique blackish lines, a little darker between the third line and the exterior border. Hind wings a little paler than the fore wings, with two dark brown stripes, the one discal, the other marginal; a brown undulating line between them. Length of the body 21 lines; of the wings 48 lines.

Jamaica.

MACROSILA *Walker*.

Size large, or very large, body thick and long. The head is large, free and advanced; the front very broad and long, tapering but little to the tips of the palpi; the eyes very large and salient; the antennæ clavato-prismatic, with a short hook and seta; the palpi very thick and ascending, and pressed against the front; the tongue twice or nearly twice the length of the body, or about *one-third* longer. The thorax is large and thick, somewhat rounded in front and tapering moderately on the sides to the head. The abdomen is tapering and cylindrico-conical, at least twice the length of the thorax. The wings are long, entire; the anterior rather broad across the inner angle, which is dilated, the hind margin obliquely convex, sometimes slightly wavy, and the interior margin with a long concave excision. The legs are long and strong, the posterior tibiæ having four very long spurs.

This group is very closely allied to *Sphinx* by the characters of the perfect insect, and I have hesitated much whether to restrict its limits as described by Mr. Walker or to extend it. The general agreement in the length of the tongue of such individuals here included as I have been able to examine, has led me to take the latter course. This will doubtless be regarded as objectionable, but I think a greater degree of clearness of arrangement is attained. Under any arrangement portions of the two groups as compared to each other do not present well marked or decided differences, and if some of the members of the present one strongly recal that of *Sphinx*, one member of the latter reproduces in its structure most of the peculiarities of *Macrosila*.

SPECIES.

§ Hind wings without distinct bands.

† Abdomen with colored spots.

54. *Antæus*.—Hind wings transparent in the middle.

55. *Cluentius*.—Grayish black; hind wings black, with interior margin and interrupted median stripe luteous.

52. *Collaris*.—Hoary; hind wings brown, with two hoary bands.

56. *Rustica*.—Blackish brown, mottled with white; hind wings blackish brown, whitish above inner angle.

†† Abdomen without colored spots.

53. *Hasdrubal*.—Grayish, or somewhat hoary; hind wings blackish brown, whitish about inner angle, with brown wavy lines.
61. *Brontes*?—Cinereous; hind wings brownish, with three blackish streaks.
‡ Tongue one-third longer than the body.
62. *Forestan*.—Hoary or gray; hind wings blackish brown, with a white patch above the inner angle, and sometimes three faint blackish lines.
§§ Hind wings with distinct bands.
60. *Quinquemaculata*.—Gray; fore wings immaculate at the base, hind wings with two distinct angulated bands.
57. *Instita*. New sp.—Brown; with the costa and connected basal, median and apical patches black on the anterior wings.
58. *Cingulata*.—Hind wings pink; abdomen with pink spots.
59. *Carolina*.—Cinereous; fore wings with a white spot at the base, central bands of hind wings indistinct.
52. *M. COLLARIS* Walker, p. 201.

Hoary, white beneath. Thorax dark brown in front, and with some brown marks on each side. Abdomen with a much interrupted, middle, brown line, and with transverse, brown spots along each side. Wings brown beneath. Fore wings with a white discal dot, and with oblique, undulating, transverse, brown lines; also with a testaceous streak which extends from the base to an oblique, undulating, testaceous band. Hind wings brown, whitish at the base and along the anterior border, and with two hoary bands. Length of the body 18—19 lines; of the wings 42—46 lines.

Egg. ?

Young Larva. ?

Mature Larva. ?

Pupation. ?

Food-plants. ?

Geographical distribution.—West Indies.

53. *M. HASDRUBAL*.—Sphinx *Hasdrubal* Cramer, III. 90, pl. 246, f. F. *Hyloicus Hasdrubal* Hübner, V. S. 139, 1488. *Sphinx Asdrubal* Poey, *Cent. Lep. Cuba, Decade II.*, with figure of larva. *Macrosila Hasdrubal* Walker, p. 202.

Somewhat hoary. Head and thorax grayish brown, the latter with a black streak on the upper edge of tegulæ. Abdomen with indistinct, lateral, blackish patches, edged before with whitish. Fore wings with a black streak at the base, with two wavy, black lines crossing the posterior part of the disc; black marks on the costa, and marginal black spots and a series of dots on the median nervules. Hind wings blackish brown, white along the interior angle, with brown undulating lines. *Male*.—The anterior wings principally brown. (Smaller than the ♀ with the black lines more distinct. The undersurface in both ash-gray with two brown bands.—Poey.)

Egg. ?

Young Larva. ?

Mature Larva. Gen. Char.—Head large. Body nearly uniformly cylindrical, with anal shield broad and truncate at the extremity. Caudal horn *extremely long, slender and membranous*.—Head reddish brown. Body black, with nine or ten bright yellow, transverse bands on the middle of the segments. The first segment, the prolegs and a spot, whence rises the caudal horn, reddish brown, dotted with black. (Poey's fig.)

Pupation.—The larval transformation takes place on the surface, where the pupa is covered simply by the superficial debris. The pupa is represented without the detached tongue-case. (Poey.)

Food-plants.—The larva feeds on a species of *Plumeria*.

Geographical distribution.—South America and Central, West Indies.

I think it doubtful whether Cramer's *Hydraspus* and *Medor* are the same species, but having no specimen of the former I am unable to determine the question. The general markings of the anterior wings are very similar, but *Hydraspus* has *three white spots* on each side of the posterior abdominal segments, besides the three yellow spots on the basal rings. This is a peculiarity neither of the male nor female *Medor* of Cramer.

Prof. Poey regards his *Duponchel* as differing specifically from *Medor* of Cramer and *Antæus* of Drury. His figure, however, does not differ from a specimen in the *Acad. Nat. Sciences* from Jamaica, nor from a Mexican specimen in my own collection, except that the latter is much larger than either, and the subterminal line in Poey's figure is more distinctly edged with white.

54. M. ANTÆUS. ———. *Merian Ins. Surin.* pl. 38. *Houttuin, Hist. Nat.* I. xl. 432, pl. 90, f. 2. Sphinx Antæus *Drury*, II. 43, pl. 25, f. 1. Sphinx Hydraspus *Cramer*, II. 31, pl. 118, f. A.(?) Sphinx Medor *Cramer*, IV. 215, pl. 394, f. A. Sphinx Jatrophæ, *Fabr. Sp. Ins.* II. 143, 18; *Mant. Ins.* II. 94, 21; *Ent. Syst.* III. 1, 362, 22. *Gmel. Syst. Nat.* I. 5, 2376, 63. Cocytius Jatrophæ *Hübner Verz. Schmett.* 140, 1497. Amphyonx Duponchel *Poey, Cent. Lep. Cuba Decade* I., with figure. Macrosila Antæus *Walker*, p. 201.

The third article of palpi a small terminal hook; anterior wings slightly wavy.

Palpi blackish brown, beneath yellowish white. Head, thorax and abdomen blackish brown intermixed with gray atoms; tegulæ with a black streak, edged beneath with whitish; abdomen with a dorsal row of black spots, and three large yellow spots on each side at the base edged with black, and black spots from the last to the tip of abdomen. Anterior wings blackish brown, sprinkled with grayish scales; a grayish spot at the base, with a double, angular, black line crossing the middle of disc to the upper third of inner margin, and two or three serrated lines of the same hue on the middle of the nervules, and a subterminal black line curving from the costa near the origin of post-apical to near the inner angle and edged anteriorly rather broadly with brownish gray; black circlelets on the ends of posterior nervules, and a broad black apical streak; black streaks in medio-central and posterior interspaces, and two discal whitish spots, one near the sub-median nerve and the other near the sub-costal. Posterior wings transparent in the middle, with black nervules and a broad, terminal, black border, with indistinct, grayish spots above inner angle; yellow at the base. Beneath, the body is whitish, with abdominal blackish spots; and the wings yellowish toward the base.

Egg. ?

Young Larva. ?

Mature Larva. ?

Pupation. ?

Food-plants. ?

Geographical distribution.—South America, Mexico, West Indies.

Measurements—a Female.

HEAD.		THORAX.		ABDOMEN.		BODY.	ANT. WING.
Length.	Breadth.	Length.	Breadth.	Length.	Breadth.	Length.	Length.
4.50	5.00—3.00	8.00	8.00	22.00	8.00	35.00	42.00

55. *M. CLUENTIUS*.—*Sphinx Cluentius Cramer*, I. 124, pl. 78, f. B.; II. 43, pl. 21, f. A. *Phlegethon-tius Cluentius Hübn. Verz. Schmett.* 140, 1500. *Macrosila Cluentius Walker*, p. 200.

Grayish black, testaceous beneath; antennæ testaceous. Thorax fawn-color on the sides. Abdomen black, with a broad cinereous stripe and several luteous spots on the sides. Anterior wings with numerous black spots or marks on the costa and inner margin, and semi-circular black marks on the ends of the nervules, with a subapical streak and stripe behind, fawn-color. Posterior wings black, with an interrupted median stripe and the interior margin luteous.

Egg. ?

Young Larva. ?

Mature Larva. ?

Pupation. ?

Food-plants. ?

Geographical distribution.—South America, West Indies.

56. *M. RUSTICA*.— — — — *Merian, Ins. Surin.* pl. 5. *Sulz. Hist. Ins.* pl. 20, f. 2. *Sphinx rustica Cramer*, IV. 21, pl. 301, f. A. *Fabr. Sp. Ins.* II. 145, 28; *Mant. Ins.* II. 95, 31; *Ent. Syst.* III. 1, 366, 33; *Gmel. Syst. Nat.* I. 5, 2385, 93; *Anon. Ins. Surin.* 225, pl. 101. *Acherontia Chionanthi Hübn. V. S.* 139, 1495. *Sphinx Chionanthi Abbot & Smith*, I. 67, pl. 34; *Duncan, Nat. Libr.* 36, 100, pl. 5, f. 2; pl. 6, f. 2. *Cocytius rustica Hübn. E. S., Lep.* III., *Leg.* IV., *Mand. A., Pond.* 2, f. 1, 2; *V. S.* 140, 1498. *M. rustica Walker*, p. 199.

Head and ends of palpi blackish brown, with a short white dash on the vertex and white spots at the base of the antennæ; palpi beneath white. Thorax blackish with white spots on the disc and tegulæ at the base of anterior wings. Abdomen blackish brown, with a narrow blackish dorsal line and three round orange yellow spots margined with black on each side and two rows of dorsal white spots. The under-surface of the thorax and abdomen is white. Anterior wings blackish brown or ferruginous brown, when faded, mottled with white; a few white spots at the base; the middle of disc crossed by two black lines and a brown one, which is margined on both sides with white, with serrated black lines traversing the nervules, margined broadly behind with brownish white; discal spot white, an irregular sub-terminal blackish line, with white marginal spots and a short, oblique, apical streak edged above with white; ciliæ white spotted. Posterior wings blackish, costa and disc yellowish, with a white spot near the base and one above the inner angle crossed by black lines.

From the Smithsonian Institution. Capt. Pope's collection.

Egg. ?

Young Larva. ?

Mature Larva.—Head and body dark green, the latter becoming yellowish on the dorsum and sides, with faint greenish lines; thoracic rings with wavy, reddish dorsal lines. Seven oblique lateral blue bands edged with purple, and beneath this a white band colored yellowish on its lower part. Horn yellow with reddish tubercles. *Abbot & Smith.*

Pupation.—Enters the ground to transform. Pupa dark reddish brown, with long detached tongue-case. applied to the breast by its point. It becomes a pupa in Georgia in July.

Food-plants.—The fringe tree.

Geographical distribution.—S. America, Mexico, West Indies, Texas, Georgia, Virginia.

Measurements—a Female.

HEAD.		THORAX.		ABDOMEN.		BODY.	ANT. WING.
Length.	Breadth.	Length.	Breadth.	Length.	Breadth.	Length.	Length.
3.50	4.00—2.50	7.00	6.00	16.00	6.50	24.00	30.00

57. *M. INSTITA*.

Head and palpi blackish brown. Thorax concolorous, rather rusty brown, with a small metathoracic black tuft. Abdomen black, with dispersed bluish scales along the dorsum, with the basal segment banded with brown and three large orange yellow spots on the sides of the basal segments; beneath and between these spots are short white marks. The legs and undersurface of thorax and abdomen blackish gray and whitish in the middle. Anterior wings are brown in the greater part, separated by an exceedingly irregular outline from a black costal portion covered with dispersed pale blue scales, and which is dilated from the costa into an angular basal, a large nearly square median and an apical irregularly oval patch; the brown portion has two broad dilations toward the costa, both extending to the sub-costal nerve. The median black patch contains a small white discal dot and is edged beneath and behind by pale brownish. The post-apical nervule and sub-costo inferior are pale colored, and toward the termination of medio-central and posterior nervules are four small black spots, two on either side of each. The fringes are brown, broadly spotted with black. Posterior wings are pale brownish and grayish from the middle to the base, with a large black patch at base, two central black bands, and between the latter and the former an oblique demi-line; a moderate, black marginal band having a bluish one in its centre. The fringes black, spotted with brown.

Male and female alike. From collection of Mr. W. H. Edwards.

Geographical distribution.—Honduras.

Measurements—a Female.

HEAD.		THORAX.		ABDOMEN.		BODY.	ANT. WINGS.
Length.	Breadth.	Length.	Breadth.	Length.	Breadth.	Length.	Length.
4.00	— ? 2.75	7.00	6.50	15.00	6.00	27.00	30.00

58. *M. CINGULATA*.—*Sphinx Cingulata* Linn. *Mus. Lud.* 96, 193; *Fabr. Sp. Ins.* II. 151, 48; *Mant. Ins.* II. 97, 53; *Ent. Syst.* III. 1; *Gmel. Syst. Nat.* I. 5, 2386, 164; 2378, 67; *Harris*, p. 293; *Walker*, p. 215. *Sphinx Druræi* Donovan, *Brit. Ins.* XIV. pl. 469; *Stephens*, I. 120, 4. *Sphinx Convolvuli* Drury, I. 54, pl. 25, f. 4; *Cramer*, III. 55, pl. 225, f. D.; *Abbot & Smith*, I. 63, pl. 32. *Agrius cingulatus* Hübn. *Verz. Schmett.* 140, 1507; *Exot. Sch., Lep.* II., *Sphing.* III., *Leg.* IV., *Mand. B.*, *Pond.* 4.

Head, ends of palpi and thorax cinereous, with a brownish tinge; palpi white beneath, prothorax with two blackish lines and tegulæ, with one central and one on superior margin of the same hue; metathoracic tufts black, with a few bluish scales. Abdomen brownish cinereous, with large rose-colored lateral patches separated by black bands. Anterior wings grayish brown, with a grayish spot at base, irregular dark brown angulated lines crossing the disc, and discal spot whitish, ringed with blackish; three dark brown lines curving across the middle of the nervules and bordered posteriorly with brownish gray, in which the last line is produced into points on the nervules; a row of dark brown circlelets on the posterior nervules, with a line of the same hue in post-apical interspace extended to the tip, and streaks of the same hue in the central and posterior interspaces. Posterior wings rosy toward the base, with a central black band and black demi-line above it, a grayish space posteriorly and a broad marginal cinereous band bordered above with black. Legs cinereous, thorax and abdomen beneath white.

From the Smithsonian Institution. Capt. Pope's collection.

Egg.

?

Young Larva.

?

Mature Larva.—Head yellowish, with two brownish dashes on each side. Body blackish brown, with a crimson vascular line containing anteriorly diamond-shaped blackish brown patches; a crimson subdorsal

line and a wavy yellowish stigmatal line, sending off just above the stigmata short curved processes. Horn short, brownish and white on the sides. *Abbot & Smith*.

Pupation.—Pupa reddish brown, with a detached cylindrical tongue-case that makes one turn and a half and is applied to the breast. The larval transformation is subterranean. In Virginia pupation began October 3d, and the imago appeared May 30th. In Georgia it began August 20th and the imago appeared September 11th. *Abbot & Smith*.

Food-plants.—The sweet potato.

Geographical distribution.—Mexico, West Indies, Texas, Georgia, Virginia, Pennsylvania.

Measurements—a Male.

HEAD.		THORAX.		ABDOMEN.		BODY.	ANT. WING.
Length.	Breadth.	Length.	Breadth.	Length.	Breadth.	Length.	Length.
3.50	4.25—2.50	6.00	6.00	13.00	5.00	20.00	22.00

59. *M. CAROLINA*.— — — — *Brown*, *Jam.* 438, pl. 43, f. 17; *Merian*, pl. 57. *Sphinx Carolina Linn.* *Mus. Lud. Utr.* 346. *Drury*, I. 52, pl. 25, f. 1. *Fabr. Sp. Ins.* II. 144, 21; *Mant. Ins.* II. 94, 24; *Ent. Syst.* III. 1, 363, 25; *Gmel. Syst. Nat.* I. 5, 2377, 7; *Abbot & Smith*, I. 65, pl. 33; *Curtis*, V. pl. 197; *Stephens*, I. 118, 1; *Wood. Int. Ext.* pl. 53, f. 22; *Harris*, p. 249; *Walker*, p. 216. *Phlegothontius Carolina Hübn. Verz. Schmett.* 140, 1503; *Exot. Schmett. Lep.* II., *Sphing.* III., *Leg.* III. *Mand. B., Obs.* b.

Head, palpi and thorax blackish gray or brownish gray; thorax grayish on the sides, with short black lines on prothorax, the middle and upper edge of tegulæ; metathoracic tufts black tipped with bluish, followed by two large black patches. Abdomen blackish gray, with a double row of dorsal white spots, five nearly round orange yellow spots on each side, with black bands between and intermediate white spots below. Anterior wings cinereous or brownish gray, with a white spot at base; angulated, somewhat indistinct blackish lines crossing the middle of the disc to the basal portion of the inner margin; discal dot white, with parallel, rather approximated, black lines crossing the middle of the nervules, an irregular sub-terminal black line and marginal whitish line; with a black line hooked below in post-apical interspace, and a short one at tip edged above with whitish and blackish shades toward the base of medio-central and posterior interspaces. Posterior wings gray, with a black spot at base, an oblique black demi-line, a double black central band and a broad marginal blackish gray band, having a black band in the middle and edged above with black. Undersurface of thorax and abdomen gray, with a reddish brown tinge.

Egg.

?

Young Larva.

?

Mature Larva.—Downy, wrinkled transversely. Head and body dark green, the latter paler on the dorsum, with whitish dots; lateral oblique white bands edged above with bluish and short transverse black lines. Stigmata black, with a yellow point above and below, except the *first* and *last*, which are orange yellow with a black central point, and all edged with blue. Shield and terminal prolegs edged below with yellow; caudal horn rust-colored terminally. Feet white, ringed with black.

Pupation.—The larval transformation takes place in a subterranean cell. The pupa is dark reddish brown, with a detached cylindrical rather thick tongue-case, not as much arched nor as long as that of *5-maculata*.

Food-plants.—The tobacco and tomato plants.

Geographical distribution.—South America, Mexico, West Indies, and generally throughout the United States.

Measurements—a Male.

HEAD.		THORAX.		ABDOMEN.		BODY.	ANT. WINGS.
Length.	Breadth.	Length.	Breadth.	Length.	Breadth.	Length.	Length.
3.50	— ? 2.50	6.00	6.00	13.50	5.25	21.75	24.00

60. M. QUINQUEMACULATA.—Phlegethontius Celeus *Hübner Ex. Schmelt. Lep.* II., *Sphing.* III., *Leg.* IV., *Mand. B., Pond.* 3. Sphinx Carolina *Donovan*, XI. pl. 361. Sphinx Quinquemaculatus *Stephens*, I. p. 119, 2; *Wood*, pl. 53, f. 23. Sphinx Quinquemaculata *Walker*, p. 217.

Head, palpi and thorax ash-gray; prothorax with three obliquely transverse black lines; tegulæ with a superior and short central black line; the lateral metathoracic tufts bluish in the middle, followed by a large black patch on each side. Abdomen gray, with a slender black dorsal line, with four or five orange yellow spots on the sides separated by black bands, having white spots above and beneath. Anterior wings gray, varied with brownish in the middle and toward the tip, with oblique black lines on the inner margin beneath median nervure, and three of the same hue arising about the middle of inner margin and curving toward the inner angle within the sub-median, and thence continued across the nervules toward the costa; a sub-terminal black and marginal white line both limited anteriorly by the disco-central nervule; a short apical black line, one in post-apical interspace hooked below, a slender recurrent one in disco-central interspace, a double one in medio-superior and blackish shades in the central and posterior. Posterior wings whitish, with a black spot at base, a black demi-line, two central, separated, serrated black lines, and a broad brownish gray marginal band, bordered broadly above with black. Undersurface of the thorax and abdomen red-ash color.

Egg. ?

Young Larva. ?

Mature Larva.—Head green, with a black stripe on each side. Body very dark green, with a black patch on first segment and lateral oblique greenish yellow bands each meeting a stigmatal stripe of the same hue, thus forming a series of angular bands on the sides. The stigmata are all black, except the first and last, which are orange yellow. The feet and caudal horn black. Body dotted with numerous yellowish green dots and marked with short black lines above the lateral bands.

Pupation.—The larval transformation is subterranean. The pupa dark reddish brown, with a cylindrical, long and much arched, detached tongue-case.

Food-plants.—The tomato and potato plants.

Geographical distribution.—Throughout the United States. I have seen a specimen from Fort Tacon in California.

Measurements—a Male.

HEAD.		THORAX.		ABDOMEN.		BODY.	ANT. WINGS.
Length.	Breadth.	Length.	Breadth.	Length.	Breadth.	Length.	Length.
3.50	4.00—2.75	6.00	6.50	15.00	5.00	23.00	24.50

61 M. BRONTES ?—Sphinx Brontes *Drury*, II. 52, pl. 29, f. 3.* *Macrosila Brontes ? Walker*, p. 199.

“The insect here described differs much from Drury’s figure, and may be a distinct species.

Cinereous. Antennæ white. Thorax margined with black, with white on the sides. Abdomen with a

* *Brontes*, Drury. “The antennæ are white inwardly, but brown outwardly. The eyes large and black. The head and neck dark brown. Thorax and abdomen gray; on the hind part of the former are two small black spots, and on each ring two small black streaks. Anterior wings gray, with a white discal spot and a small white cloud next the tips; having several curved and indented black lines crossing them from the anterior

median black line and two angulated black streaks on the sides. Anterior wings with a white discal spot, with transverse angulated interior brown and exterior black lines, with an exterior undefined white band and streak behind, sometimes obsolete, and with exterior black streaks. Hind wings brownish, with three blackish streaks.

Geographical distribution.—United States."

62. M. FORESTAN.—Sphinx Forestan *Cramer*, IV. 216, pl. 394, f. B. Cocytius Forestan *Hüb. Verz. Sch.* 140, 1499. Macrosila Forestan *Walker*, p. 203.

Tongue *one-third* longer than the body.

Head and tips of palpi brownish gray, the latter beneath gray or whitish. Thorax with a black line in front extended on the sides to tegulæ, where it is bordered below with whitish. Abdomen brownish gray, with a lateral black angulated band on each side, sometimes a black stripe with dull yellowish spots. Anterior wings gray or hoary, more or less varied with green and pale brownish, with a black streak along the base of inner margin, several black angulated lines crossing the disc and angulated black lines crossing the base of the nervules; discal spot grayish, adjacent to which is a greenish brown median patch; black streaks at the base of medio-central and posterior interspaces and blackish circlelets on the ends of posterior nervules, with a black curved sub-apical line. Posterior wings nearly uniform blackish brown, with a whitish patch above the interior angle crossed by two or three black lines; sometimes with faint blackish transverse bands.

Collection Acad. Nat. Sciences, Philadelphia and Mr. W. H. Edwards, of Newburg.

Egg. ?

Young Larva. ?

Mature Larva. ?

Pupation. ?

Food-plants. ?

Geographical distribution.—South America, Honduras.

Measurements—a Female.

HEAD.		THORAX.		ABDOMEN.		BODY.	ANT. WINGS.
Length.	Breadth.	Length.	Breadth.	Length.	Breadth.	Length.	Length.
3.50	— ? 2.50	6.50	5.50	13.00	6.00	23.00	28.00

SPHINX *Linn.*

The size is very large, large or moderate. The body is long, tapering and cylindrical. The head free and prominent, the front broad, long and conical. The antennæ prismatic, a little longer than the thorax, with a short hook and seta. The tongue variable. The thorax advanced and tapering on the sides to the head. The abdomen somewhat more than twice longer than the thorax and sometimes nearly thrice. The

to the posterior edges, some being faint and others very distinct. The fringes are brown, spotted with white. The inferior wings are of a very dark brown, but along the abdominal edges and corners are gray. Fringe like that of the superior wings. *Beneath*, breast white; abdomen white with four central reddish spots; anterior wings uniform, dark grayish brown, with a narrow white streak at the tips. Inferior wings crossed by two faint lines and also of a dark grayish brown."

From New York.

wings are long and narrow; the length of the anterior exceeding that of the body, and about one-third as long as they are broad across the inner angle, with the tip acuminate, the hind margin entire and usually very obliquely convex, with the inner angle rounded and the inner margin nearly straight or slightly concave. The legs are moderately long and stout, the hind tibiæ with four very long spurs.

Larva.—The head is large, semi-oval and flattened in front. The body is almost uniformly cylindrical, smooth and obliquely banded on the sides, with an arching caudal horn, and the thoracic segments somewhat folded. The tongue-case of the pupa is short and detached, but reposes upon the breast. It is contained in a subterranean cell.

SPECIES.

- § Tongue nearly twice as long as the body.
63. *Leucophæata*. New sp.—Gray; hind wings grayish, with a median and broad marginal black band.
 §§ Tongue one-third longer than the body.
 † Hind wings banded with black.
64. *Cinerea*.—Gray, reddish gray beneath; hind wings grayish.
65. *Sordida*.—Brownish cinereous or blackish brown, white beneath; hind wings yellowish.
 †† Hind wings not banded.
66. *Plebeia*.—Gray; hind wings blackish, grayish toward the base; tegulæ with a black stripe.
 §§§ Tongue as long or nearly as long as the body.
71. *Coniferarum*.—Gray; hind wings uniform dark brownish.
67. *Kalmiæ*.—Ferruginous or hoary and ferruginous; hind wings with a median and marginal black band.
68. *Drupiferarum*.—Anterior wings blackish brown, disc and exterior margin whitish fawn-color.
70. *Gordius*.—Dark brown with a roseate tinge; thorax blackish brown on dorsum.
69. *Luscitiosa*. New sp.—Hind wings yellow, with a broad marginal black band.
 §§§§ Tongue extending to the end of fifth abdominal ring.
- 70 *Jasminearum*. New sp.—Gray; hind wings blackish brown, grayish above inner angle.
 † Tongue unknown.
- Lugens*.—A variety of *Sordida*?

GROUP I.

Size very large. Head large. Eyes large and salient. Tongue nearly twice as long as the body. Palpi thick, ascending and pressed against the front.

63. S. LEUCOPHÆATA.

Head, palpi and thorax gray; tegulæ with a black line on the superior margin. Abdomen grayish, with a black patch on each side at the base and alternate black and whitish demi-bands. Anterior wings gray, with a small black patch about the middle of the base; an indistinct blackish double line arises at the base of the inner margin and extends to the origin of medio-central vein, and two lines of the same hue cross the lower portion of disc obliquely to about the same point; a blackish wavy line, curved toward the costa, and bordered beneath with pale gray, arises about the middle of the inner margin and extends to the lower part of disco-central nervule, whence it retreats indistinctly to the costa; a sub-terminal, angulated, abbreviated black line, bordered irregularly with pale gray. A deep black streak in post-apical interspace

continued to the tip, and conspicuous black streaks at the base of medio-central and posterior interspaces; discal spot obscure and whitish; fringes gray. Posterior wings grayish, with a black median band and broad black marginal band, with a space on terminal margin from the middle to the inner angle, gray.

Beneath, thorax ash gray, abdomen white, with a few brownish ventral spots.

Male and female, from Smithsonian Institution. Capt. Pope's collection.

Egg. ?

Young Larva. ?

Mature Larva. ?

Pupation. ?

Food-plants. ?

Geographical distribution.—Texas.

Measurements—a Female.

HEAD.		THORAX.		ABDOMEN.		BODY.	ANT. WING.
Length.	Breadth.	Length.	Breadth.	Length.	Breadth.	Length.	Length.
4.25	4.75—3.50	7.00	7.00	18.00	6.50	29.00	36.00

GROUP II.

Size large or moderate. The head moderate. The eyes small and but moderately salient. The tongue one-third longer than the body, or about as long or somewhat shorter. The palpi are thick and slightly exceed the front, with which the hairs of the tip are scarcely identified.

64. *S. CINEREA* Hübner, *Harris*, p. 294, 2. *Lethia Chersis* Hübner, *Exot. Schmett. Lep.* II., *Sphing.* III., *Leg.* IV., *Mand. B.*, *Pond.* 5.

Head, palpi and thorax dark gray; tegulæ tipped with whitish terminally, with a black line on the superior edge and a short indistinct one above and parallel to it, and a metathoracic spot on each side. Abdomen dark gray, with a black dorsal line and alternate black and white lateral demi-bands. Anterior wings dark gray, with a black spot at base, a delicate black discal line; a black streak at the tip and in post-apical interspace, bordered above with pale gray, in sub-costo inferior, medio-central and posterior interspaces, and a slender black line in sub-median sulcus; a sub-terminal blackish line and one near the margin bordered below with pale gray and both abbreviated toward costa. Posterior wings sordid gray, with a broad median and a terminal black band.

From Samuel H. Scudder, Esq., of Boston.

Egg. ?

Young Larva. ?

Mature Larva. ?

Pupation. ?

Food-plants.—Dr. Harris found the larva on the lilac.

Geographical distribution.—Massachusetts, Wisconsin.

65. *S. SORDIDA* Hübner, *Harris*, p. 296, 7; *Walker*, p. 219. *Agrius Eremitus* Hübner, *Exot. Schmett. Lep.* II., *Sphing.* III., *Leg.* IV., *Mand. B.*, *Pond.* 4. *Sphinx lugens* Walker, p. 219?*

* *S. LUGENS.*—Blackish gray, paler beneath. Head and thorax paler on each side. Thorax with two black stripes. Abdomen with interrupted white and blackish bands. Fore wings slightly tinged with brown, with

Dark brownish cinereous. Head and thorax paler on the sides, with a rather broad blackish brown stripe on the middle of tegulæ, extending to prothorax and edged above with two lines of the same hue, and with a brownish dorsal line on the disc of thorax; metathoracic spots, black. Abdomen with a dorsal black line and alternate black and whitish demi-bands on the sides; beneath white, with central blackish spots. Anterior wings brownish cinereous, with a black margined white discal spot, through which passes a short blackish discal dash, and a smaller one above it; with blackish brown costal marks over the disc, the two most posterior of which reach to the discal spot and are joined or nearly joined at an angle by two more or less distinct lines from the inner margin of the base; a broad diffuse blackish brown apical streak with a costal line above it in apical interspace, and blackish brown streaks in the interspaces, except the medio-superior; an abbreviated blackish brown line edged exteriorly with grayish near the terminal margin. Posterior wings yellowish white, with a black spot at the base, a median and broad marginal band black. Length of the body 16 lines; expansion of the wings 35 lines.

Smithsonian Institution. Capt. Pope's collection in Texas.

Var. A. a male.—Brownish, with two distinct dark brown lines from the inner margin of base and the middle of the costa, angulated on the disc; over the median nervules the wing is dark brown, with faintly indicated irregular lines crossing the middle of the nervules to the costa and grayish spots exterior to them. Length of the body 22 lines; expansion of the wings 54 lines.

Near Jalapa, Mexico. Acad. Nat. Sciences, Philadelphia.

Var. B. a male.—Blackish cinereous; two distinct black angulated lines crossing the posterior portion of the disc from the inner margin of base; with a band of blackish brown lines crossing the middle of the nervules. Length of the body 20 lines; expansion of the wings 47 lines.

Near Jalapa, Mexico. Acad. Nat. Sciences, Philadelphia.

Mr. Walker's *lugens* is probably one of these varieties of *sordida*.

Egg. ?

Young Larva. ?

Mature Larva. ?

Pupation. ?

Food-plants. ?

Geographical distribution.—Mexico, Texas, Massachusetts.

66. S. PLEBEIA.—*Fabr. Sp. Ins.* II. 146, 31; *Mant. Ins.* II. 95, 34; *Ent. Syst.* III. 1, 367, 36; *Gmel. ed. Syst. Nat.* I. 5, 2385, 91; *Harris*, p. 296, 9; *Stephens*, I. 222, 7; *Wood, Ind. Ent.* pl. 53, f. 25. *Anceryx plebeia* Walker, p. 224.

Head and thorax dark gray, with a transverse black line on prothorax continued to the tegulæ, which are pale grayish beneath it. Abdomen gray, with a slender black dorsal line and a black stripe on each side containing whitish spots. Anterior wings gray, with a short black stripe at the base of the inner margin, two very oblique, short black lines from the basal portion of costa to the disc, sometimes uniting with the line from the base on the disc, and two distinct serrated black lines crossing the middle of the nervules from about the origin of post-apical to the lower third of inner margin; black streaks in all the interspaces, that in medio-superior contained in a white streak, and short white streaks on the terminal

black costal marks, and with discal and exterior streaks; two whitish discal dots, the fore one occasionally obsolete. Hind wings black, with two whitish undulating bands; ciliæ white. Length of the body 17—19 lines; of the wings 42—46 lines.

Mexico.

portion of medio-central and posterior interspaces; discal spot white and the nervules tipped with blackish at their ends. Posterior wings blackish brown, grayish towards the base and the inner border, and sometimes faintly grayish in the middle.

Collection Acad. Nat. Sciences, Philadelphia, and Mr. Edward Norton.

Egg. ?

Young Larva. ?

Mature Larva. ?

Pupation. ?

Food-plants. ?

Geographical distribution.—Pennsylvania, Connecticut, Massachusetts.

Measurements—a Female.

HEAD.		THORAX.		ABDOMEN.		BODY.	ANT. WING.
Length.	Breadth.	Length.	Breadth.	Length.	Breadth.	Length.	Length.
2.75	—? 2.00	4.50	4.50	10.50	4.50	16.50	17.00.

67. S. KALMIÆ.—*Abbot & Smith*, I. 73, pl. 37; *Harris*, p. 295. *Lethia Kalmiæ Hübner*, *Verz. Schmett.* 141, 1511.

Head and thorax ferruginous brown, paler on the sides; tegulæ with a central and upper black line, metathoracic patches black. Abdomen ferruginous brown with a central black line and alternate whitish and black demi-bands. Anterior wings ferruginous brown, paler in the middle, with two oblique blackish streaks at the base of inner margin and very oblique ferruginous streaks from the costa to disc; a pale streak in post-apical interspace, margined on each side with ferruginous, and ferruginous and brownish streaks in the remaining interspaces, with a whitish line near the margin edged above with blackish; discal spot small and ferruginous; fringes reddish brown. Posterior wings brownish white, with a broad central and terminal black band; exterior margin reddish brown and fringes of the same hue.

I have seen a specimen of this insect from the collection of Mr. Arch. Hopkins, of Williamstown, Mass., whose right wing, although somewhat lighter than the specimens described, was sufficiently well marked to be readily recognized, but the left was almost entirely *hoary*, with faint brownish markings.

Egg. ?

Young Larva. ?

Mature Larva.—Head green, with a lateral black stripe. Body fine pale green, deepening on the sides, with pale yellow, lateral, oblique bands edged above with black, which is again bordered with pale blue; first and second prolegs with a black spot on the sides; stigmata orange yellow; shield and terminal prolegs dotted with numerous brown dots on a pale brownish patch; caudal horn blue, but thickly covered with black tubercles. Length about *three inches*.

Pupation.—The larval transformation is subterranean. The pupa dark brown; the tongue-case half as long as the breast and applied to it, with the extremity bulbous. The larva enters the pupa state during the latter part of August or in September, and appears as an imago in the following June or early in July.

Food-plants.—I have found the larva nearly full grown on the *lilac* about the middle of July. Also feeds on the leaves of *Kalmix latifolia*. (*Abbot & Smith*.)

Geographical distribution.—Canada, New York, Pennsylvania, Massachusetts, Georgia.

Measurements.

HEAD.		THORAX.		ABDOMEN.		BODY.	ANT. WING.
Length.	Breadth.	Length.	Breadth.	Length.	Breadth.	Length.	Length.
2.50	—? 1.50	4.50	4.25	11.00	4.00	18.00	24.00

68. *S. DRUPIFERARUM*.—*Abbot & Smith*, I. 71, pl. 36; *Harris*, p. 294, 3. *Lethia drupiferarum* *Hübner*, *Verz. Schmett.* 141, 1510.

Head and thorax blackish brown, whitish fawn-color on the sides. Abdomen brown, with a slender dorsal line and a lateral black band on each side containing brownish white spots. Anterior wings dark brown, with costa from base beyond the disc, and to median nervure below, whitish fawn-color, with wavy, separated dark brown lines crossing lower portion of the nervules, the last bordered above with whitish; a fawn-colored marginal space tapering to the tip and containing a whitish line. A black discal dash, and two delicate black discal lines continued singly on the disco-central nervule, with black streaks in sub-median sulcus and all the interspaces except the medio-superior. Posterior wings whitish, with a broad median black band enlarged toward the costa and sub-terminal black band, with the terminal margin fawn-color.

Egg. ?

Young Larva. ?

Mature Larva.—Head green, with a lateral blackish band. Body pale green, with lateral, oblique purple bands, edged beneath with white; caudal horn dark reddish brown, yellow on the sides at base; stigmatae orange yellow. Length about $3\frac{1}{2}$ inches.

Pupation.—The larval transformation takes place in a subterranean cell. The pupa is dark brown, with reddish brown between the segments and the tongue-case short, reposing on the breast and truncate at the extremity. The perfect insect from the fall larva appears early in June.

Food-plants.—The larva feeds on the leaves of the various varieties of *Plum*.

Geographical distribution.—Pennsylvania, Massachusetts.

Measurements—a Female.

HEAD.		THORAX.		ABDOMEN.		BODY.	ANT. WING.
Length.	Breadth.	Length.	Breadth.	Length.	Breadth.	Length.	Length.
3.00	3.00—2.00	6.00	5.00	12.00	5.00	19.00	23.00

69. *S. LUSCITOSA*.

Antennae blackish brown. Palpi blackish brown. Head and thorax blackish brown or blackish and white on the sides. Abdomen brown, with a black stripe on each side. Anterior wings pale brown, with a ferruginous hue; the inner border fuliginous, a terminal fuliginous band tapering to the tip of the wing, with a wavy outline anteriorly, and the costa and a patch on the costa above the tip of the same hue; a slender black discal line, with black lines and streaks in all the interspaces and sub-median sulcus. Fringes blackish. Posterior wings yellow or stramineous, with a broad terminal black band and the fringes whitish.

From Mr. Robert Kennicott, taken in the pine forests of Wisconsin. Collection of George Newman, of Philadelphia.

Egg. ?

Young Larva. ?

Mature Larva. ?

Pupation. ?

Food-plants. ?

Geographical distribution.—Wisconsin, New York.

Measurements—a Male.

HEAD.		THORAX.		ABDOMEN.		BODY.	ANT. WING.
Length.	Breadth.	Length.	Breadth.	Length.	Breadth.	Length.	Length.
1.50	2.75-1.50	3.25	3.50	8.00	3.50	13.00	15.00

70. *S. GORDIUS*.—*Cramer*, III. 91, pl. 247, f. B; *Harris*, p. 295, 6. *Lethia Gordius Hübner Verz. Schmiett.* 141, 1512.

Head and disc of the thorax blackish brown or black and reddish gray on the sides. Abdomen dark gray, with a dorsal black line and alternate black and grayish demi-bands. Anterior wings blackish gray, with a roseate hue; discal spot conspicuous and white, a discal black line bifid toward the discal spot, with the usual lines and streaks in interspaces and sub-median sulcus, black; a blackish brown marginal shade, with pale grayish on the portion of the wing above it, at the base and the tip of the wing. Fringes dark brown spotted with white. Posterior wings gray, with a black median band, and a broad, black marginal band; the fringes white.

From the collections of Messrs. Edward Norton, A. J. Packard and S. H. Scudder.

Egg. ?

Young Larva. ?

Mature Larva.—Apple green, with seven oblique white lateral bands, slightly edged above with violet, a rusted caudal horn, and a brownish line on each side of head. (*Harris*.) There is almost too much resemblance in this description to the larva of *drupiferarum*.

Pupation.—The larval transformation is subterranean; pupa with a very short detached tongue-case. *Harris*.

Food-plants.—The larva feeds on the leaves of the apple tree. *Harris*.

Geographical distribution.—Maine, Massachusetts, Connecticut.

Measurements—a Male.

HEAD.		THORAX.		ABDOMEN.		BODY.	ANT. WING.
Length.	Breadth.	Length.	Breadth.	Length.	Breadth.	Length.	Length.
2.00	2.50-1.75	4.00	4.00	8.50	4.00	14.50	17.50

71. *S. JASMINEARUM* *Le Conte, Sr., Wilson, Treat. Ent. in Ency. Brit.* pl. 236, f. 5, 6.

Palpi gray-brownish on the sides. Head and thorax pale gray, with a transverse black line on prothorax extended to the middle of tegulæ, with a black dash in the middle of the disk and metathoracic black streaks on each side of median line. Abdomen dull gray, with a black stripe on each side containing whitish spots. Anterior wings gray, with blackish brown markings; a blackish streak at the base of inner margin, with two brownish lines from the disc to its lower end; two blackish brown oblique lines or a broad oblique streak from the costa to the disc at the origin of median nervules; discal spot white, with a brownish discolored patch just posterior to it, extending from costa at the origin of sub-costo inferior nervule to medio-posterior interspace, where it becomes a black spot, and continued thence to inner margin as two brownish lines; two doubly curved lines of connected spots crossing the middle of the nervules from near the origin of post-apical to the lower third of the inner margin, with an irregular brownish line near the terminal margin; a long, decided black streak in medio-central interspace, with a blackish spot on the terminal margin of the medio-central nervule. Posterior wings nearly uniform blackish brown, with a faint grayish central band and a grayish patch above the interior angle.

From collection of Messrs. W. H. Edwards and Mr. Ridings, of Philadelphia.

Egg. ?

Young Larva. ?

Mature Larva. ?

Pupation.—Larval transformation subterranean. The pupa is dark brown, with a very short cylindrical tongue-case bulbous at the extremity, and applied to the breast.

Food-plants.—Mr. Newman, of Philadelphia, found a pupa of this insect beneath an isolated ash tree, under such circumstances as to render it probable that this is one of the food-plants of the larva.

Geographical distribution.—Long Island, New York, Pennsylvania.

Measurements—a Male.

HEAD.		THORAX.		ABDOMEN.		BODY.	ANT. WING.
Length.	Breadth.	Length.	Breadth.	Length.	Breadth.	Length.	Length.
2.50	—?—2.75	4.50	4.50	10.00	4.50	16.50	20.00

This insect, I believe, has not heretofore been described. The imago and larva were figured many years since by Mr. John Le Conte; the figures, however, were never published. Mr. Wilson obtained copies of these by some means and reproduced them, and very badly, in his Treatise on Entomology, without describing the imago.

Tongue somewhat longer than the body.

72. S. CONIFERARUM.—*Abbot & Smith*, I. 83, pl. 42. *Hyloicus coniferarum Hübner, Verz. Schmett.* 139, 1484. *Anceryx coniferarum Walker*, p. 224.

Cinereous; white beneath. Thorax with a brown stripe on each side. Abdomen cinereous without bands. Anterior wings, with a brown basilar, wavy line, a brown costal spot above the discal spot, which is blackish; with a crenated brown line crossing the middle of the nervules edged anteriorly with whitish. A long black streak in medio-central interspace, and a shorter one in the posterior, with the ends of the nervules tipped with blackish. Posterior wings brown. *Abbot & Smith's figure.*

From S. H. Scudder, Canada, near Buffalo, N. Y.

Egg. ?

Young Larva. ?

Mature Larva.—Head yellow with two black lines. Body gray, with three rows of dorsal, square, dark gray spots, one of which is vascular, having a black dot at each angle, and a slender, whitish, vascular line, with whitish striæ between the square spots. First segment with two dashes and one subdorsal on each side. The larva is full grown about August 27th and Nov. 10th, which latter produces an imago in April following. *Abbot & Smith.*

Pupation. ?

Food-plants.—*Pinus palustris.*

Geographical distribution.—Georgia, Canada.

Measurements—a Female.

HEAD.		THORAX.		ABDOMEN.		BODY.	ANT. WING.
Length.	Breadth.	Length.	Breadth.	Length.	Breadth.	Length.	Length.
2.00	2.50—1.50	4.00	4.00	9.50	4.00	14.00	16.00

ANCERYX Walker.

Body rather long and slender. The head large, free and prominent; the front broad, sub-conical, the vertex pilose or sub-tufted; the eyes large and salient; the tongue as long as the body; the palpi rather slender, scantily pilose and pressed against the front, with the terminal article *exposed*. Antennæ as long or some-

what longer than the thorax, with a short hook and seta. Thorax well developed anterior to the base of the fore wings, but rounded anteriorly, usually with a slight double crest on the fore part of the dorsum. Abdomen slender and oblanceolate, at least twice the length of the thorax. Legs long and slender, hind tibiæ with moderate spurs. The wings narrow and moderately long; the length of the anterior less than that of the body, and about three times longer than broad across the inner angle, the tip acuminate, the hind border obliquely rounded, but wavy between the nervules, the inner angle rounded and the inner margin moderately concave. Posterior wings rather acute at the tip, with the hind margin entire.

SPECIES.

A. Hind wings reddish.

† Abdomen not banded.

74. *Obscura*.—Hoary; hind wings margined with brown along anterior angle.

78. *Enotrus*.—Cinereous; hind wings margined with blackish brown.

‡ Abdomen banded.

73. *Ello*.—Gray; hind wings with a broad, marginal, blackish brown band.

79. *Caicus*.—Cinereous; hind wings red, with black marginal radii.

AA. Hind wings luteous.

75. *Scyron*.—Hoary cinereous; hind wings broadly margined with black.

76. *Alope*.—Brown; hind wings broadly margined with brown.

AAA. Hind wings brown.

77. *Guttularis*.—Hoary; hind wings ferruginous at base.

73. A. ELLO.— — — *Merian Ins. Surin.* pl. 61, f. 2. *Sphinx Ello Linn. Syst. Nat.* 800, 13; *Mus. Lud. Ulr.* 351. *Drury*, I. 58, pl. 27, f. 3; *Cramer* IV. 24, pl. 301, f. D.; *Fabr. Sp. Ins.* II. 143, 17; *Mant. Ins.* II. 94, 20; *Ent. Syst.* III. 1, 362, 21; *Gmel. Syst. Nat.* I. 5, 2375, 13; *Harris*, p. 297, 11. *Erinnys Ello Hübner, Verz. Schmett.* 139, 1489. *Anceryx Ello Walker*, p. 224.

Head smooth, thorax scarcely crested.

Head and thorax gray; the front of thorax and the vertex discolored with blackish, without distinct markings, with a black line on sides of thorax extending from the eyes to the base of anterior wings. Abdomen gray, with a dorsal gray band, containing a slender blackish line, and banded with alternate black and gray bands in both sexes. Anterior wings pale grayish, varied with blackish; with a blackish stripe extending irregularly from the base to the tip, and consisting chiefly of streaks between the nervules; base of the wing blackish, with a patch in costa over disc, and at the origin of subcosto-inferior nervule, and with a row of marginal black spots in the interspaces. Posterior wings rust red, with a broad, blackish brown, terminal band and a cinereous patch at the anterior angle.

The anterior wings of the specimens described are unfortunately worn.

From the Smithsonian Institution. Capt. Pope's Collection.

Egg. ?

Young Larva. ?

Mature Larva.—Head purple; body obscure brown, with a black dorsal line, and spotted irregularly with white on the sides; caudal horn purple. *Merian*.

Pupation. ?

Food-plants.—The leaves of a species of *Psidium* or Guava. *Merian*.

Geographical distribution.—South America, West Indies, Mexico, Texas, Southern United States, California.

Measurements—a Male.

HEAD.		THORAX.		ABDOMEN.		BODY.	ANT. WING.
Length.	Breadth.	Length.	Breadth.	Length.	Breadth.	Length.	Length.
3.00	3.50—2.25	5.00	4.50	12.00	4.50	18.00	18.00

74. A. OBSCURA.—*Sphinx obscura Fabr. Sp. Ins.* II. 142, 14; *Mant. Ins.* II. 94, 16; *Ent. Syst.* III. 1, 361, 17; *Gmel. Syst. Nat.* I. 5, 2375, 58. *Erinnys Stheno Hübner, Exot. Schmett. Lep.* II., *Sphing.* III., *Leg.* IV., *Mand.* A., *Leves* 2.

Vertex and thorax with distinct double crests.

Hoary and somewhat bluish gray. Head and thorax dark gray and paler on the sides, the latter with a few short black lines, or with the disc before blackish brown, and a stripe of the same hue on the sides. Abdomen dusky gray *without bands*, and two brownish dorsal lines. Anterior wings hoary, or gray tinted with bluish, with blackish markings; a blackish streak extending from base to the tip, and a short, nearly parallel blackish streak above the interior angle; a blackish patch on costa at the posterior extremity of the disc, a fainter one about the middle, and another at the origin of the post-apical nervule; a row of black dots on the lower third of the nervures and another about the middle, each series being connected by a faint acutely angled line; a row of marginal, black dots in which terminate faint, slender, blackish lines in the interspaces from the post-apical to the medio-central. Posterior wings rust-red or reddish fawn-color, with a dark brown patch on the terminal margin, about the interior angle, and a series of indistinct dots above the nervules.

In the markings of the anterior wings this species bears a very striking resemblance to *Ello*.

From the Smithsonian Institution. Capt. Pope's collection.

Egg. ?

Young Larva. ?

Mature Larva. ?

Pupation. ?

Food-plants. ?

Geographical distribution.—Mexico, West Indies, Texas.

Measurements—a Female.

HEAD.		THORAX.		ABDOMEN.		BODY.	ANT. WING.
Length.	Breadth.	Length.	Breadth.	Length.	Breadth.	Length.	Length.
2.50	3.00—2.00	4.50	3.75	10.00	4.00	16.00	16.00

75. A. SCYRON.— — — *Merian, Ins. Surin.* pl. 62, f. 2. *Sphinx Scyron Cramer, IV.* 23, pl. 301, f. E. *Erinnys Scyron Hubn. Verz. Schmett.* 139, 1491. *Anceryx Scyron Walker, p.* 225.

Hoary, cinereous. Thorax with a broad, anterior, blackish band, and two blackish, posterior, abbreviated bands. The segments of the abdomen with interrupted, blackish bands, separated and whitish. Fore wings dark brown, varied with yellowish, with a few brown bands more or less definite and branched,

sometimes almost obsolete. Posterior wings luteous, broadly margined with black, with a somewhat hoary patch along the interior angle.

Geographical distribution.—South America, West Indies.

76. A. ALOPE.—Sphinx Alope *Drury*, I. 58, pl. 27, f. 1; *Cramer*, IV. 23, pl. 301, f. G.; *Fabr. Mant. Ins.* II. 94, 19; *Ent. Syst.* III. 1, 362, 20; *Gmel. Syst. Nat.* I. 5, 2375, 62. Erinnys Alope *Hübner, Verz. Schmett.* 139, 1492. Anceryx Alope *Walker*, p. 225.

Thorax doubly crested.

Brown. Abdomen blackish, with hoary interrupted bands and a dorsal stripe. Anterior wings with a series of angular black lines about the middle of the nervures, with a paler streak near the middle of the inner margin, more or less bent backwards, sometimes blackish brown. Hind wings luteous or orange yellow, with a broad brown terminal margin.

Var. β. Female.—Brown, cinereous beneath. Head and thorax with a blackish stripe. Abdomen hoary, with three slender black stripes and with broad black bands; tip fawn-color. Fore wings with indistinct blackish lines and streaks, and with some exterior fawn-colored streaks. Hind wings luteous, with very broad dark brown borders; exterior margin somewhat fawn-colored. Length of the body 20 lines; of the wings 39 lines.

Geographical distribution.—S. America, West Indies.

77. A. GUTTULARIS *Walker*, p. 227.

Hoary, whitish beneath. Head and fore part of the thorax with a brown middle line. Abdomen with a slender whitish stripe, and with a slight lilac tinge. Wings beneath pale brown, white at the base and along the interior border of the hind wings. Fore wings with a black streak along the middle, and with several black dots. Hind wings brown, ferruginous at the base; ciliæ white. Length of the body 10 lines; of the wings 18 lines.

Geographical distribution.—St. Domingo.

78. A. ŒNOTRUS.—Sphinx Œnotrus *Cramer*, IV. 22, pl. 301, f. C. Erinnys Œnotrus *Hübner, Verz. Schmett.* 139, 1490. Anceryx Œnotrus *Walker*, p. 227.

Thorax doubly crested.

Cinereous, beneath white. The head is whitish, with the sides of a dirty rose color. The segments of the abdomen whitish, and white beneath, with black points towards the sides. Anterior wings reddish brown toward the base, with slightly fawn-colored lines and streaks, sometimes with the margins brown in part. Posterior wings rufescent or reddish brown, with a terminal blackish brown band and a small cinereous patch at the interior angle.

Geographical distribution.—S. America, Mexico, West Indies.

Hind margin of fore wings not denticulated, entire?

79. A. CAICUS.—Sphinx Caicus *Cramer*, II. 42, pl. 125, f. F.; *Fabr. Sp. Ins.* II. 151, 49; *Mant. Ins.* II. 97, 53; *Ent. Syst.* III. 1, 375, 57; *Gmel. Syst. Nat.* I. 5, 2378, 68. Anceryx Caicus *Walker*, p. 228.

Cinereous. Thorax with three blackish brown stripes. Abdomen with two dorsal black lines and broad interrupted black bands. Anterior wings with pale brownish and blackish brown lines in the interspaces, a blackish brown line on the inner margin and a white discal line. Posterior wings red, with black radii from the hind margin.

Geographical distribution.—South and Central America, West Indies,

DOLBA *Walker.*

Size moderate or small. The body is stout, and rather short. The head rather small, but free and moderately prominent; the front broad, vertical, rounded and obtuse; the eyes quite small and scarcely salient; the palpi nearly horizontal and equal to the front; the tongue somewhat longer than the body; the antennæ rather slender, with a short hook and seta, and about as long as the thorax. The thorax but little advanced anterior to the base of fore wings, tapering but little to the head and rounded in front. The abdomen rather conical, and about twice the length of the thorax. The length of the anterior wings rather more than that of the body, somewhat more than twice longer than broad, the tip rounded, the hind margin entire and oblique, somewhat prominent in the middle and slightly concave above the inner angle; inner margin slightly concave. Posterior wings obtusely rounded at the tip, hind margin entire and somewhat concave before the inner angle.

80. D. HYLÆUS.—*Sphinx Hylæus Drury*, II. 45, pl. 25, f. 3; *Cramer*, II. 16, pl. 107, f. C.; *Fabr. Sp. Ins.* II. 149, 45; *Mant. Ins.* II. 97, 49; *Ent. Syst.* III. 1, 373, 53; *Gmel. Syst. Nat.* I. 5, 2383, 81; *Harris*, p. 296, 8. *Sphinx Prini Abbot & Smith*, I. 69, pl. 35. *Hyloicus Hylæus Hübner*, *Verz. Schmett.* 139, 1487. *Dolba Hylæus Walker*, p. 230. *Hyloicus Dynæus Hübner*, *Zutr.* f. 463-4?

Palpi white beneath. Head and thorax brownish ferruginous, and whitish on the sides, with two white dots on the disc of thorax and two black metathoracic spots. Abdomen brownish ferruginous, with a row of dorsal brown spots and a double row of white spots, and with lateral alternate black and narrow white demi-bands. Anterior wings dull ferruginous, or dark brownish varied with white and blackish; a white spot at the base, with a blackish band, white margined towards the base, crossing the middle of the disc; discal spot white and black margined, a band of blackish lines crossing the middle of the nervules, margined posteriorly broadly with whitish, and black circlets on the posterior ends of median nervules; apical line black, white margined toward costa. Posterior wings whitish, with an indistinctly double, median blackish band, joined near inner margin by a blackish patch from the base and a broad terminal dark brown band edged above with blackish. Sometimes the wing is blackish brown, with a central white line and a fainter one above it, with white at the base.

Collections of Messrs. W. H. Edwards and Edward Norton.

Egg. ?

Young Larva. ?

Mature Larva.—Head green, with a pale blue line on each side. Body pea green, with lateral oblique pink bands edged below with white; caudal horn crimson. *Abbot & Smith.*

Pupation.—Pupa reddish brown; tongue-case not apparent. Pupation began May 17th, and the imago appeared June 19th. Another entered the pupa state August 25th, and appeared April 26th, in Georgia. *Abbot & Smith.*

Food-plants.—*Prinos glaber*, Winterberry.

Geographical distribution.—Mexico, Georgia, Massachusetts, Connecticut.

CERATOMIA *Harris.*

Size large. Body usually thick and long. The head small, nearly sessile, and somewhat depressed; front broad and almost vertical, pilose or sub-tufted; the eyes

small and scarcely salient; the palpi rather short and slender, nearly horizontal and not identified with the front; tongue about one-third as long as the body, not as long as the thorax; the antennæ longer than the thorax, ending in a short hook with seta. The thorax is thick, sub-globose, but little advanced anterior to the base of the fore wings. The abdomen is cylindrical, tapering near the extremity, and nearly thrice or full thrice the length of the thorax. The legs stout and the hind tibiæ with two long internal and two short external spurs. The wings are rather broad, the anterior with the tip rounded, the hind margin entire, obliquely convex, and the inner margin somewhat concave above the interior angle. *Male*.—Antennæ ciliferous. *Female*.—Antennæ simple.

Larva.—Head large, semi-oval, somewhat flattened in front. Body wrinkled transversely and granulated, with a vascular line of fleshy serrations and a thoracic dorsal line of granulations on each side, and with four thoracic fleshy granulated horns; caudal horn rather short, straight and roughened. The pupa is smooth; tongue-case not apparent. Transformation subterranean.

SPECIES.

82. *Quadricornis*.—Fawn-color or greenish brown; hind wings pale brownish, with two indistinct blackish lines and broad sub-terminal band.

83. *Repentinus*.—Gray, varied with black; hind wings blackish gray, with three parallel black bands.

82. C. QUADRICORNIS *Hübner*. *Harris*, p. 293. *Agrius Amyntor Exot. Schmett. Lep. II., Sph. III., Leg. IV., Mand. B., Pond. 4.*

Palpi brown. Head grayish or whitish fawn-color. Thorax with the disc fawn-color or greenish brown and whitish on the sides, a short transverse dark colored line before and the tegulæ with a central and superior blackish line on each side, with black metathoracic spots. Abdomen fawn-colored or brownish, with a slender black dorsal line and two black stripes on each side. Anterior wings fawn-color, varied with blackish brown, or dull greenish brown varied with black; costa grayish at the base, with wing of a pale hue above the median nervure and dusky beneath it; three dark brown irregular lines advance from the basal portion of the inner margin to the disc beyond its middle, and thence retreat to the costa; discal spot white, with a short black discal dash resting on median nerve; several sub-terminal blackish lines arise above the interior angle and run nearly parallel to the hind margin to disco-central nervure, whence they retreat to the costa; black streaks in all the interspaces, with the fringes brown, spotted with white. Posterior wings pale brownish, with a sub-terminal blackish or dark brown band and shaded with blackish in the middle or forming indistinct dark colored lines.

Egg. ?

Young Larva. ?

Mature Larva.—Head pale green, with an indistinct whitish lateral stripe. Body pale green, becoming just before pupation in one of the sexes more or less reddish brown, dotted with obscure granulations; lateral stripes pale greenish, with whitish granulations and two thoracic dorsal white granulated lines; caudal horn greenish; stigmata black encircled with yellow and divided by a yellow line. Feet reddish or tipped with reddish. Length about 3 inches.

Pupation.—The larval transformation is subterranean. Pupa dark brown, smooth cylindrico-conical,

tongue-case not apparent. The larva reaches maturity about the beginning of September, and appears as an imago during the following May or June.

Food-plants.—The larva feeds on the leaves of *Ulmus Americana*, the American Elm.

Geographical distribution.—Massachusetts, Pennsylvania, Michigan.

Measurements—a Female.

HEAD.		THORAX.		ABDOMEN.		BODY.	ANT. WING.
Length.	Breadth.	Length.	Breadth.	Length.	Breadth.	Length.	Length.
2.50	3.00—2.00	6.00	5.50	14.00	6.00	22.00	26.00

83. *C. REPENTINUS*.

Head and thorax dark gray, paler on the sides; prothorax with two black transverse lines, the first edged above with luteous scales; tegulæ with a central black stripe. Abdomen dark gray, pale gray on the sides, with a slender dorsal black line and with two black stripes on each side. Anterior wings pale or rather deep cinereous, varied with black and white; two black lines arise near the basal portion of the inner margin and cross the disc to the costa, sometimes indistinct or obsolete in the middle; a blackish costo-discal patch containing a short black discal streak; discal spot white and black margined; two distinct sets of double, serrated, undulating black lines cross the middle of the nervules, and are separated by pale grayish or whitish, with an irregular whitish line near hind margin; a black apical line margined with whitish, and black streaks in the two last median interspaces; fringes white, spotted with dark brown. Posterior wings blackish gray, with three parallel, narrow undulating black bands; fringes white, spotted with dark brown.

From collections of Messrs. Edward Norton and W. H. Edwards.

Egg. ?

Young Larva. ?

Mature Larva. ?

Pupation. ?

Food-plants.—I have been assured by various collectors that the larva feeds on the *ash*; none of them, however, were able to describe it from recollection.

Geographical distribution.—Michigan, Connecticut, New York, Pennsylvania.

Measurements—a Female.

HEAD.		THORAX.		ABDOMEN.		BODY.	ANT. WINGS.
Length.	Breadth.	Length.	Breadth.	Length.	Breadth.	Length.	Length.
2.25	— ? 1.75	5.25	4.75	13.50	5.00	19.00	24.50

GENUS *SMERINTHUS* *Latr.*

Size moderate or large. The body is robust and thick, with the tip of the abdomen turned upward in the males. The head is small, sessile, sometimes sunken and depressed; the front moderately broad, vertical, pilose or sub-tufted: the eyes small scarcely prominent or visible from above; the palpi thick and short, but equal to the front; the tongue almost as long as the palpi; the antennæ usually without the terminal hook, without distinct seta, and about as long as the thorax. Thorax short, almost globose and but little advanced. The abdomen cylindrico-conical, more than twice longer than the thorax. Wings without bristle and hook. The anterior are longer than the body, and about twice as long as broad; the hind margin angulated

opposite the post-apical vein and the medio-central, truncate at the tip and excavated between the angles, or denticulated along the hind margin; the inner margin is deeply concave above the interior angle, which is somewhat prominent. *Male*.—Antennæ densely ciliferous or sub-pectinated, with the articles produced beneath. *Female*.—Antennæ simple.

Larva.—The head is semi-oval or pyramidal, with vertex acute. The body granulated, with a caudal horn, and obliquely banded with dorsal thoracic lines on each side. Transformation subterranean. The pupa of Group I. smooth and cylindrico-conical, and the position of the larva, when at rest or when disturbed, sphinx like.

SPECIES, GROUP I.

§ Costa of posterior wings concave and dilated toward the tip.

84. *Myops*.—Hind wings ochre-yellow internally, externally chocolate brown; ocellus black, pupil pale blue.

85. *Excæcatus*.—Hind wings rosy internally; ocellus black, pupil pale blue.

§§ Costa of posterior wings rounded and entire from base to tip.

86. *Modestus*.—Olivaceous; hind wings purplish red, with a black patch above inner angle.

87. *Geminatus*.—Hind wings rosy; ocellus black, with two or three blue pupils.

88. *Ophthalmicus*.—Variety of *Geminatus*?

89. *Astylus*.—Reddish brown or cinnamon colored; anterior wings with sub-terminal whitish bands.

GROUP II.

Antennæ sub-pectinated in the ♂, simple in ♀; hind margin of anterior wings undulating in the ♂, crenated in the ♀.

90. *Juglandis*.—Pale fawn-color.

GROUP I.

§ *Hind wings dilated on the costa at the tip.*

† *Fore wings angulated and excavated on the hind margin.*

84. *S. MYOPS*.—Sphinx myops *Abbot & Smith*, I. 51, pl. 26. *Smerinthus rosacearum Boisduval*, *Sp. Gen. Lep.* pl. 15, f. 4. *Smerinthus myops Harris*, p. 291, 3. *Paonias myops Hübn. Verz. Schmett.* 142, 1520.

Palpi, head and thorax chocolate brown and the two latter portions with a purplish or rosy tinge; the sides of palpi and a stripe in the middle of the thorax tawny yellow. Abdomen brownish luteous, with irregular tawny yellow spots, and the hind portions of the segments dark brown. Anterior wings chocolate brown, with a faint purplish or reddish gray tinge towards the base; a small blackish spot at the base, between median and sub-median nerves; an indistinct brownish curved line crosses the basal portion of the disc, with a large, median, chocolate brown patch, with its anterior margin darkest, inclined towards the anal angle, and joined at an acute angle by a patch of the same hue about the middle of sub-median nervure; one or two wavy sub-terminal brown lines, with an irregular chocolate brown band near the hind margin, extending from the tip to about the middle of the wing and thence to anal angle indistinctly; a dull yellow patch above anal angle, with blackish spots above it in sub-median sulcus, and another about the middle of apical interspace, with an angular, narrow, bluish line at the tip. Posterior wings dull yellow, with the

costa and outer portion from near the middle, chocolate brown, and one or two short bluish lines above the tip and a dull yellow spot upon it; ocellus black, with a large pale blue pupil.

Egg. ?

Young Larva. ?

Mature Larva.—From Abbot & Smith's figure; head bluish green, with a bright yellow line on the sides. Body bluish green with a row of sub-dorsal and stigmatal reddish brown spots; six oblique lateral bright yellow bands, with two thoracic sub-dorsal yellow (?) lines; caudal horn yellow on the sides.

Pupation.—The larva enters the earth to transform. In the Southern States the first brood enters the pupa state about the middle of June, and becomes imago early in July; pupation begins with the second during the latter part of October, and they appear as perfect insects during the following spring. The pupa is smooth, abdomen cylindrico-conical and acute; color deep brown. (*Abbot & Smith.*)

Food-plants.—The leaves of the wild cherry.

Geographical distribution.

Measurements—a Female.

HEAD.		THORAX.		ABDOMEN.		BODY.	ANT. WING.
Length.	Breadth.	Length.	Breadth.	Length.	Breadth.	Length.	Length.
2.00	2.50—1.75	3.50	4.00	7.00	3.00	12.00	13.00.

†† *Fore wings denticulated on hind margin, with a denticulation opposite disco-central nearly obsolete.*

85. *S. EXCÆCATUS.*—*Sphinx excæcata* Abbot & Smith, I. 49, pl. 25. *Smerinthus excæcata* Harris, 290, 1.

Paonias excæcatus Hübner, *Verz. Schmett.* 142, 1521; *Zutr. f.* 835, 6. ♂.

Palpi, head and thorax fawn-color, with a roseate tinge, with a chestnut-colored thoracic dorsal stripe tapering to the head and metathoracic transverse patch of the same hue. Abdomen fawn-color with a dark brown dorsal line. Anterior wings fawn-color, with dark brown shades, with a small blackish spot at the middle of base and two brown lines crossing the basal portion of the disc; a large, median, brown patch, with its anterior margin darkest and inclined towards the inner angle, and the posterior margin concave in the middle, tinged with purplish towards the center, containing a brown discal dot, and joined at an acute angle by a patch of the same hue about the middle of the submedian nervure; two or three brown lines crossing the middle of the nervules and following the outline of median patch, succeeded by an irregular brownish band; the marginal space brown; a small brown spot at inner angle, with two or three black spots above it in sub-median sulcus, with faint blackish streaks in the post apical, subcostal and costo-inferior and medio-superior interspaces. Posterior wings rose-color in the middle, with a brownish patch at the tip crossed by two or three short whitish lines; ocellus black, pupil pale blue, with two short whitish lines between the ocellus and the inner margin.

Var. A male. Brownish olivaceous. Thoracic streak dark brown. The median shade of the fore wings brownish olivaceous with a purplish tinge, and a deep brown streak at the base of posterior interspace; discal spot blackish.

Egg.—Spheroids much flattened above and beneath, almost like narrow sections of a cylinder; smooth, white, with an equatorial, reddish brown band, having a slender, central, white line. Investing tunics thick and resisting.

Young Larva, on first emerging from the egg is green, without granulations, and oblique, lateral stripes; a long reddish caudal horn; without thoracic subdorsal lines.

Mature Larva.—I regret I have no description of the mature larva. The following is that of Harris: Apple green, with two short, pale lines before, seven oblique, yellowish white lines on each side and a bluish caudal horn. According to Abbot & Smith's figure, the head is green with a crimson line on each

side; the body yellowish green, lateral bands and caudal horn yellow, with a subdorsal and double stigmatal row of crimson spots.

Pupation.—The larva enters the ground to transform; the pupa is chestnut brown, smooth, with a short, obtuse, terminal spine.

Food-plants.—The leaves of the apple tree and those of the *Rosa Carolina*.

Geographical distribution.—Pennsylvania, Massachusetts, Georgia.

Measurements—a Male.

HEAD.		THORAX.		ABDOMEN.		BODY.	ANT. WING.
Length.	Breadth.	Length.	Breadth.	Length.	Breadth.	Length.	Length.
2.25	2.50—1.50	4.00	4.50	9.50	4.00	15.00	16.00

§§ *Costa of superior wings rounded and entire from the base to the tip, which is rounded.*

† *Fore wings denticulated on hind margin, with that opposite disco-central nearly obsolete.*

86. *S. MODESTA* Harris, *Amer. Jour. Sci.* 36, 292; *Lake Superior*, &c., 388, pl. 7, f. 7.

Palpi, head, thorax and abdomen olivaceous. Anterior wings from the base to nearly the hind end of the disc very pale olivaceous, with an indistinct, irregular, darker streak across the middle, and margined towards the base of the wing with a still paler hue; a broad, deep, olivaceous, median band, undulating anteriorly and crenated or undulating posteriorly, containing a pale, angular, discal spot and darkest towards the base of the wing; a deep, olivaceous band across the middle of the nervules crenated posteriorly and bordered with a paler hue; the remainder of the wing is deep olivaceous with a paler band from the middle to the inner angle. Posterior wings purplish red in the middle, with a transverse, black spot above inner angle and a blackish, olivaceous patch beneath it; in the male the wing is olivaceous exteriorly and along terminal border.

From the collections of Messrs. S. H. Scudder, W. H. Edwards and Arthur Schott of Georgetown, D. C.

Egg. ?

Young Larva. ?

Mature Larva. ?

Pupation.—Mr. Ashton, of N. Y., has taken the perfect insect in July.

Food-plants.—Mr. Crist, of Nazareth, Northampton Co., Pa., informed me he found a larva of this insect several years ago on the Lombardy poplar.

Geographical distribution.—Massachusetts, Lake Superior, Pennsylvania, Sonora, Mex., New York.

Measurements—a Male.

HEAD.		THORAX.		ABDOMEN.		BODY.	ANT. WINGS.
Length.	Breadth.	Length.	Breadth.	Length.	Breadth.	Length.	Length.
2.00	— ? 2.00	4.00	5.00	12.00		17.00	23.00

†† *The hind margin of fore wings angulated and excavated.*

Articles of the antennæ with single short pectinations in ♂, simple in the ♀.

87. *S. GEMINATUS*.—*Sphinx geminata* Say, I. pl. 12, f. 1, 2. *Smerinthus geminata* Harris, 291, 4.

Sphinx ocellatus Jamaicensis Drury, II. p. 43, pl. 25, f. 2, 3. *Smerinthus Cerisii* Kirby, IV. 301, pl. 4, f. 4.

Palpi reddish brown; head thorax in front and tegulæ whitish or pale gray, with a large, thoracic, dorsal, deep chestnut, semi-oval patch. Abdomen brownish gray. Anterior wings gray, tinged with rosy and with dark brown streaks and patches; two curved, brownish, basal lines bordered with rosy gray; the

basal half of medio-posterior interspace filled by a dark brown or a ferruginous brown patch, joined by a line of the same hue crossing the disc from the costa and obliquely by another from the upper third of inner margin, shaded posteriorly with brownish, through the centre of which passes the sub-median nervule; discal spot pale, margined with brown; a brownish band, margined before with darker brown, crosses the base of the nervules, and is followed by two or three more or less distinct rosy gray and brownish, undulating, subterminal lines; a deep brown, semi-oval patch at the tip edged with whitish, and a ferruginous brown spot above inner angle, usually with two smaller spots above it; the middle of terminal space dark brown. Posterior wings rosy, along exterior and terminal border yellowish gray; ocellus black, emitting a short, broad line to inner angle, and with two or three blue pupils.

Specimens from Messrs. Robt. Kennicott, of Illinois, and S. H. Scudder, of Mass.

Egg. ?

Young Larva. ?

Mature Larva. ?

Pupation. ?

Food-plants.—I have secured numbers of the pupa from the middle of October to the beginning of November at the base of willows.

Geographical distribution.—Canada, Illinois, Massachusetts, Pennsylvania, Jamaica.

Measurements—a Female.

HEAD.		THORAX.		ABDOMEN.		BODY.	ANT. WINGS.
Length.	Breadth.	Length.	Breadth.	Length.	Breadth.	Length.	Length.
2.00	2.00—1.75	3.50	4.00	7.50	4.00	12.50	14.50

†† *Structure unknown.*

88. *S. OPHTHALMICUS* *Boisduval, Ann. Soc. Ent. t. III. 3me Ser. xxxii.*

Le *S. ophthalmica* assez rapproché de notre *Ocellata*, plus voisin de *Gemina* de Say, mais l'oeil n'est pas double et il diffère de toutes les espèces du meme groupe par sa large bande brune, anguleuse, qui traverse le milieu des ailes supérieures.

S. ophthalmicus is nearly related to the European *ocellatus*, and more intimately to *geminatus* of Say, but the pupil is not double, and it differs from all the species of the same group by having a large, angular, brown band traversing the middle of the superior wings.

This description of M. Boisduval is almost too indefinite to authorize even a conjecture respecting this species, but it will possibly prove to be merely a variety of *geminatus*.

††† *Antennæ ciliferous in the ♂, simple in the ♀.*

89. *S. ASTYLUS.*—Sphinx *Astylus Drury, Ills. Exot. Ins. II. 45, pl. 26, f. 2.* *Smerinthus Astylus Harris, Amer. Jour. Sci. 36, p. 290, 2; interegerrima Cat. Ins. Mass. Emmons, Nat. Hist. New York, V. pl. 40, f. 4.* Sphinx *Io Boisduval, Guér. Icon. Règn. Anim. Ins. pl. 84.*

Reddish brown or cinnamon-colored. Thorax with a dorsal ferruginous stripe attenuated before. Tegulæ tinged with rosy white in the ♀. Abdomen fawn-color, with a faint dorsal brownish line and the sides in the ♂, somewhat tawny yellow, in the ♀ rosy white. Anterior wings very white toward the base in the ♀, with a bluish black stripe along the inner margin, and a line of the same hue along the medio-posterior nervule, joining it near the inner angle, with sub-terminal whitish bands faintly tinged with roseate and, a

tawny yellow spot at the tip and inner angle. Posterior wings tawny yellow or lutescent, intermixed with brownish toward the costa, and a black ocellus above the inner angle, with a bluish pupil. Undersurface of anterior wings tawny yellow, somewhat reddish brown exteriorly, with yellow spots and white bands corresponding to those on the upper surface. Posterior wings reddish brown, with two parallel, irregular rosy white central lines. Length of the body 45 lines; expanse of the wings 30 lines in the ♂, 33 lines in the ♀.

Dr. Harris' collection, by the favor of Mr. S. H. Scudder.

Egg. ?

Young Larva. ?

Mature Larva. ?

Pupation. ?

Food-plants. ?

Geographical distribution.—Massachusetts, New York.

GROUP II.

The hind margin of the anterior wings somewhat excavated from the tip to medio-central nervule, and thence rounded to the inner angle, entire in the ♂, crenated in the ♀. Posterior wings emarginate at the tip, hind border entire in the ♂, crenated in the ♀. Antennæ with the stalk ciliferous, and the articles produced beneath the stalk each bearing four short pectinations in the ♂, and simple in the ♀. Palpi short in the ♀ and scarcely exceeding the front; in the ♂ exceeding it, divergent, almost attaining the level of the vertex, the development being in the second article and the third rudimental; the tongue about as long as the palpi.

Larva.—Is granulated on transverse wrinkles, tapers anteriorly, the thoracic rings being slender. The head is pyramidal and granulated, the vertex elevated above the dorsum and bifid; caudal horn densely spined. The pupa is rough, with the terminal segments of abdomen flattened.

The position of the larva at rest is not sphinx-like; it is extended along the mid-rib of a leaf, and when disturbed, throws its head from side to side, making a crepitating noise.

This group has its European representative in *Smerinthus populi*.

90. *S. JUGLANDIS.*—*Sphinx juglandis* Abbot & Smith, I. 57, pl. 29. *Amorpha dentata juglandis* Hübner, *Exot. Schmett.* I., *Lep.* II., *Sphing.* III., *Leg.* IV., *Amorph.* B., *Denb.* b. f. 1–4. *Polyptychus juglandis* Hübner, *Verz. Schmett.* 141, 1513. *Smerinthus juglandis* Harris, 292, 5. *Bombyx*? *Emmons, Nat. Hist. N. Y.*, V. pl. 45, f. 9, an indifferent figure of the ♂.

Palpi reddish brown or dark brown; head and thorax pale fawn-color or pale grayish, with a more or less distinct thoracic dorsal, brownish stripe. Abdomen fawn-color or unicolor. Anterior wings, from the base to about the middle of disc, pale gray, with a faint lilac tinge or pale fawn-color, and a brownish line crossing the basal part of the disc; a broad median shade, with its posterior margin commencing on the costa midway between the origin of post-apical vein and the tip, and inclined to about the middle of inner margin, darkest at the edges and ochraceous brown, dark brownish or ferruginous brown, and sometimes almost obsolete above the medio-posterior vein, whence is emitted two lines which mark the outline of the shade; a line

of the same hue parallel to posterior margin of median shade, with an intervening paler space and a light colored shade near hind margin, extending from disco-central vein to the inner angle; the marginal space dark colored, with a small light colored costal spot extended to the tip. Posterior wings ochraceous brown or dull fawn-color, with a central light colored band edged on each side by dark lines, corresponding to the posterior edge of median shade and its parallel line.

From the collections of Messrs. W. H. Edwards, Robert Kennicott and S. H. Scudder.

Egg. ?

Young Larva. ?

Mature Larva.—Head pale reddish brown, with a pale yellow lateral stripe and granulations. Body pale green or yellowish green, with oblique lateral crimson streaks, edged beneath with pale yellow; body tinged with crimson above the prolegs and behind the horn; granulations pale yellow; horn brownish, with blackish spinules. Feet dark reddish brown. Length about $2\frac{1}{4}$ inches.

Pupation.—The pupa is blackish brown, roughened, with four little prominences on the front of the head-case, and the terminal segments flattened on the ventral surface. The larva attains its full growth about the middle of September, and undergoes its transformation in a cell just beneath the surface.

Food-plants.—The leaves of the *black walnut* and the *hickory*.

Geographical distribution.—Massachusetts, New York, Pennsylvania, Georgia.

Measurements—a Female.

Length of the body 12 lines; expansion of the wings 34 lines.

DAREMMA *Walker.*

Body rather slender. Proboscis short, distinct. Antennæ setaceous, serrated, a little longer than the thorax. Abdomen tapering, full thrice the length of the thorax. Legs rather short and stout; hind tibiæ with four long spurs. Wings long, moderately broad. Fore wings very slightly convex in front, hardly acuminate, entire, slightly convex and very oblique along the exterior border. Hind wings hardly acuminate.

91. *D. UNDULOSA* *Walker*, p. 231.

Cinereous, hoary beneath. Thorax with a black testaceous-bordered band in front and another behind, where there is also a white band; a black stripe on each side. Abdomen with slight testaceous bands, with a brown stripe in the middle, and with brown spots along each side. Wings with white brown spotted ciliæ. Fore wings with slender undulating blackish bands, three toward the base and four beyond the middle, where there is a white blackish-bordered discal spot; a blackish apical streak. Hind wings with three brown bands.

Length of the body 13 lines, of the wings 36 lines.

Orilla, West Canada.

GENOSANDA *Walker.*

Male.—Size small. Body moderately stout, subfusiform. Head slightly crested. Proboscis moderately long. Palpi a little longer and more slender than in the other genera; third joint minute, conical, apparent. Antennæ setaceous, very minutely serrate, much longer than the thorax. Abdomen less than twice the length of the

thorax, slightly tufted at the tip. Legs rather slender; hind tibiæ with four moderately long spurs. Wings rather short, moderately broad. Fore wings rounded at the tips, moderately oblique and slightly convex along the exterior border; first, second and third inferior veins somewhat approximate; fourth remote.

92. *Æ. NOCTUIFORMIS* Walker, p. 232.

Hoary, whitish beneath. Head with a brownish crest. Thorax with a brownish stripe along each side. Abdomen with a black dot on each segment. Fore wings with several slender undulating or angular, dark brown bands, and with a transverse more distinct streak by the interior angle, near which there is a brown spot. Hind wings brown, yellow towards the base.

Length of the body 6 lines, of the wings 14 lines.

St. Domingo.

LAPARA Walker.

Male.—Body rather slender. Head small, short. Proboscis moderately long. Palpi very short. Antennæ slender, subclavate, hardly longer than the thorax and attenuated but hardly hooked toward the tips. Abdomen linear, full twice the length of the thorax. Legs slender; hind tibiæ with four moderately long spurs. Wings rather narrow, not long. Fore wings almost straight in front, slightly rounded at the tips, straight and very oblique along the exterior border; interior border straight; second inferior vein far nearer to the first than to the third; fourth very remote. Hind wings rounded at the tips.

This genus has much outward resemblance to the *Bombycidæ*.

93. *L. BOMBYCOIDES* Walker, p. 233.

Cinereous. Fore wings with a zigzag, oblique, black line, and with several lanceolate, black marks. Hind wings brownish, paler towards the base; ciliæ white.

Length of the body 10 lines; of the wings 24 lines.

Canada.

ELLEMA.

Size small. Body rather slender, diameter nearly equal, but slightly fusiform in the ♂. The head is quite small, sessile and somewhat depressed, being but partially visible from above; the front moderate, vertical and subtufted; the palpi rather short and slender, but equal to the front; the tongue equal to palpi; the eyes very small; the antennæ terminating in a short hook and seta, and longer than the thorax. The thorax is very short and pilose, but little advanced anterior to the base of the fore wings and rather globosely rounded in front. The abdomen is cylindrical, or nearly so, and about thrice the length of the thorax. The anterior wings are equal to the length of the entire body, and are a little more than twice longer than broad, with the tip rounded, and the hind margin entire and obliquely convex, the inner angle rounded and the inner margin straight. Hind wings rounded at the tips.

Male.—Antennæ prismatic and ciliferous. *Female*.—Antennæ fusiform and finely ciliated.

94 E. HARRISII.—*Sphinx coniferarum* Harris, p. 297.

The palpi, head and thorax moderately pale umber, with the sides of the thorax at the base of the anterior wings and lower portion of tegulæ grayish. Abdomen brownish gray. Anterior wings umber colored, varied with pale gray, with two blackish brown lines from the inner margin crossing the disc to the costa, and a series of blackish lunules in the interspaces, extending from the costa a little beyond the origin of post apical nervule to the lower third of the inner margin and bordered interiorly with pale gray; the mark in medio-central interspace is lanceolate, and sometimes that in the posterior interspace; the ends of the nervules tipped with dark brownish; fringes brown, spotted with white. Lighter towards the base. *Female*. The pale gray less abundant on anterior wing, with long black dashes in the basal portion of medio-central and posterior interspaces, and blackish in the middle of sub-median sulcus.

From the collection of Mr. A. S. Packard, Jr., Brunswick, Me.

Egg. ?

Young Larva. ?

Mature Larva.—Mr. George Newman, a collector in Philadelphia, assures me he has taken the larva of this insect near maturity on the pines of New Jersey about the latter part of September. He could describe it only in general terms. It was without a caudal, horn and in general color green.

Pupation. ?

Food-plants. ?

Geographical distribution.—Maine, New Jersey, New Hampshire, North Carolina.

Measurements—a *Male*.

HEAD.		THORAX.		ABDOMEN.		BODY.	ANT. WINGS.
Length.	Breadth.	Length.	Breadth.	Length.	Breadth.	Length.	Length.
1.50	1.75—1.00	3.00	3.50	8.00	3.00	12.00	11.50

ARCTONOTUS Boisd.

Male.—Body thick, very pilose. Proboscis very short, obsolete. Palpi stout, very short and pilose. Antennæ thick, serrate, very pubescent, much longer than the thorax. Abdomen elongato-obconical, hardly longer than the thorax. Legs stout, pilose; hind tibiæ with four rather short spurs. Wings moderately broad, not long, hardly denticulated, rather deeply ciliated. Fore wings straight in front, slightly acuminate, rather oblique and slightly convex along the exterior border; second inferior vein (medio-superior) nearer to the third (medio-central) than to the first (disco-central); third rather further from the fourth (posterior) than from the first. Hind wings much rounded at the tips.—Walker.

This genus appears to connect *Smerinthus* with the *Bombycidae*.

95. A. LUCIDUS Boisd. Walker, p. 264.

Male.—Gilded, tawny. Palpi brown. Antennæ testaceous with ferruginous branches. Lappets of the thorax (tegulæ) with a darker border, which has a whitish edge. Fore wings with two oblique, purplish bands, which are connected along the interior border. Hind wings red, with gilded borders, and with a ferruginous submarginal band.

"Size of our *Cenotheræ*. Wings quite entire; the superior dim yellowish gray, with a brilliant yellow reflection, marked with two or three very obscure transverse bands, the most decided of which is sinuous and placed near the extremity. Inferior wings violet, with the extremity of an obscure purple and the fringe paler.

Body very short; corselet very hairy, of the color of the superior wings. Antennæ very robust (*très fortes*.) Under-surface of the wings of a grayish tint, with the disc of the superior ferruginous." *Boisduval, Ann. Soc. Ent. Fr.* 2me ser. X. p. 319.

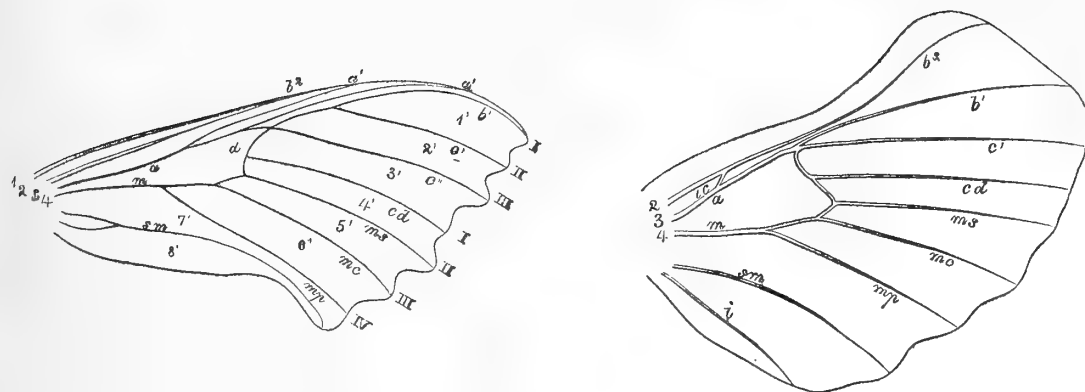
California.

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Fig. 1.
SMERINTHUS EXÆCATUS.



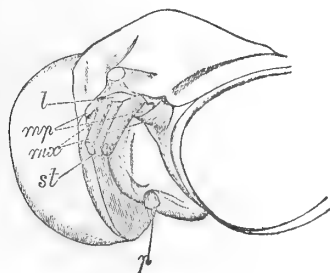
- | | | |
|---|-----------------------------|---------------------|
| 1. Marginal nervure. | 4, m. Median nervure. | <i>Interspaces.</i> |
| 2, b^2 . Costal nervure. | ms. Medio-superior nervule. | 1'. Apical. |
| 3, a. Sub-costal nervure. | mc. " central nervule. | 2'. Post-apical. |
| a'. Sub-costo marginal nervules. | mp. " posterior nervule. | 3'. Disco-central. |
| b'. " apical nervule. | sm. Sub-median nervure. | 4'. Medio-superior. |
| c'. " post-apical nervule. | d. D'scal nervure. | 5'. " central. |
| c''. " inferior nervule. | ic. Intercostal nervule. | 6'. " posterior. |
| cd. Disco-central nervule. | i. Internal nervure. | 7'. Sub median. |
| The lower wing is enlarged to show its structure with distinctness. | | 8'. Internal. |

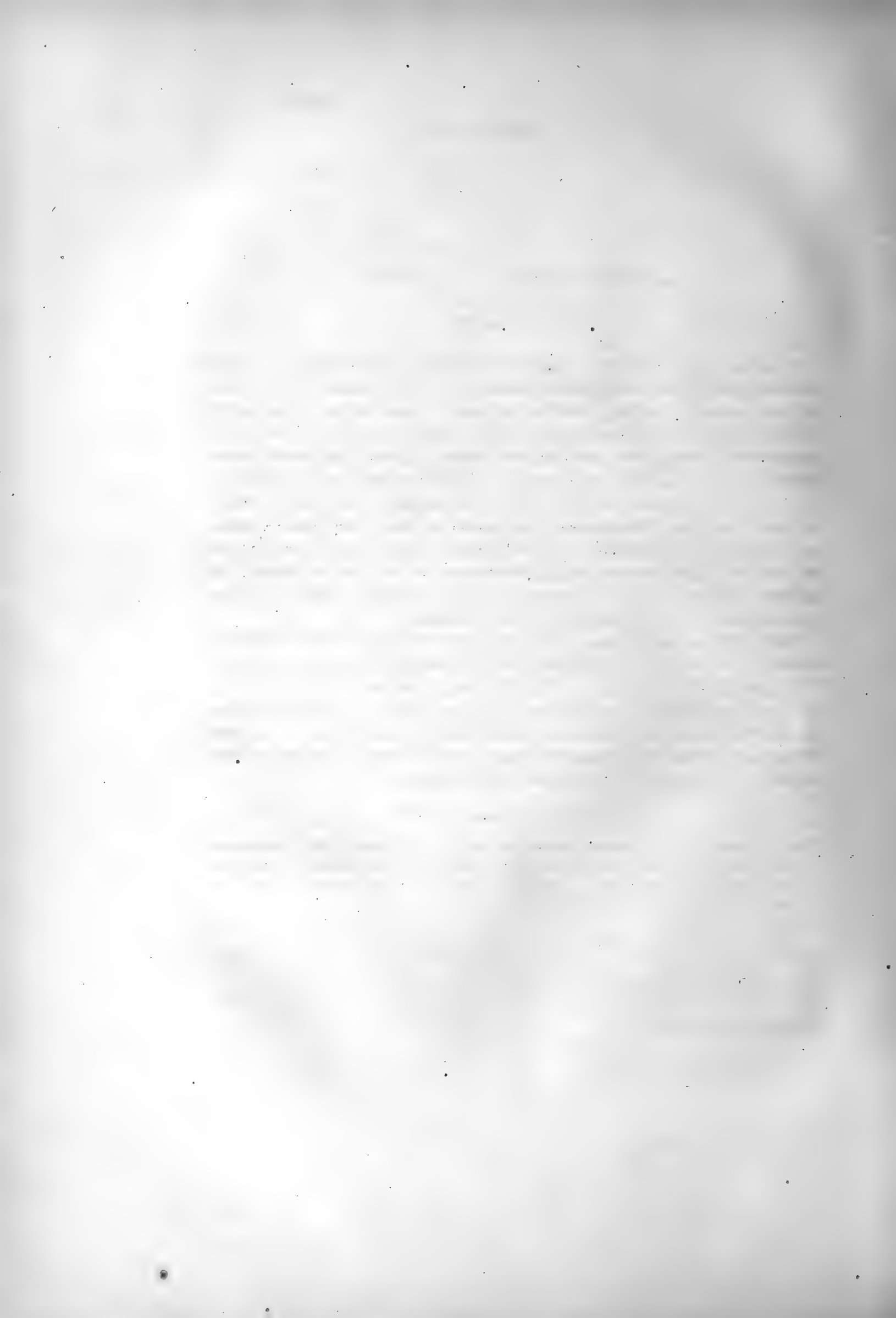
Fig. 3.
CERATOMIA QUADRICORNIS.



- | | |
|----------------------------------|---------------------------------------|
| mx. p. External maxillary palpi. | mx. Mandibles. |
| s. t. Spiral tongue. | f. foramina (cephalic stigmata?). |
| l. Labrum. | int. mx. p. internal maxillary palpi. |

Fig. 4.
M. QUINQUEMACULATA.





ART. VI.—*New Unionidæ of the United States.*

BY ISAAC LEA, LL. D.

In my last paper, which was published in the Journal of the Academy, there were described at length, forty-one new indigenous species of the *Unionidæ*, many of which had the advantage of the diagnosis of the soft parts. I now offer to the Academy, in this paper, carefully made descriptions of thirty-eight species, which include a few diagnoses of the soft parts of old species not before examined anatomically, and of which I have given carefully made figures. All the new species of my own in this paper are from Georgia, and are referred to in the Proceedings of the Academy, where they have been simply characterized. We have by no means exhausted Georgia as yet. I have prepared diagnoses of the soft parts of many heretofore described, and new ones are almost constantly being received by me from various friends in the Southern States, who are greatly interested in their development. These will appear from time to time in our Proceedings and in our Journal.

The descriptions and figures of the soft parts in this paper will be found to be important. That of *Unio multiplicatus* (nobis) represents the anomalous character of the female of this large and multiplied species, so common in the valley of the Ohio, with her distended branchial uterus occupying the four leaves of the branchiæ, charged with probably three or four millions of embryonic shells ready to be hatched. The singularly formed plicate branchial uterus of *Woodwardianus* (nobis) and *phaseolus*, Hild., will also attract the attention of the zoologist.

UNIO BULBOSUS. Pl. 21, fig. 75.

Testâ lævi, obliquâ, valdè inflatâ, valdè inæquilaterali, posticè obtusè angulatâ; valvulis crassis, anticè crassioribus; natibus tumidis et elevatis; epidermide nigricante, micante, eradiatâ; dentibus cardinalibus subgrandibus, subpyramidatis crenulatisque; lateralibus curtis, subcrassis subrectisque; margaritâ vel albâ vel salmonis colore tinctâ et iridescente.

Shell smooth, oblique, very much inflated, very inequilateral, obtusely angular behind; valves thick, thicker before; beaks swollen and elevated; epidermis blackish, shining, without rays; cardinal teeth rather large, somewhat pyramidal and crenulate; lateral teeth short, rather thick and nearly straight; nacre either white or salmon colored and iridescent.

Poc. Acad. Nat. Sci., 1857, p. 172.

Hab.—Flint River, near Macon, Geo. J. C. Plant and H. M. Neisler, M. D.

My cabinet and cabinet of Mr. Plant.

Diam. .8,

Length 1.2,

Breadth 1.8 inches.

Shell smooth, oblique, very much inflated, very inequilateral, obtusely angular behind and regularly rounded before; substance of the shell thicker before; beaks swollen and raised; ligament short, thick and brown; epidermis nearly black, shining above and striate towards the margin, without rays, with obscure distant lines of growth; umbonial slope much raised and angular; posterior slope flattened, slightly wrinkled, with two obscure impressed lines on each valve; cardinal teeth rather large, somewhat pyramidal, slightly compressed and crenulate; lateral teeth short, rather thick, nearly straight and corrugate; anterior cicatrices distinct and well impressed; posterior cicatrices distinct; dorsal cicatrices placed under the plate within the cavity of the beaks and deeply impressed; cavity of the shell rather deep and rounded; cavity of the beaks rather shallow and rounded; nacre either white or salmon color and iridescent.

Soft Parts.—*Branchial uterus* not charged, but ova were found in the ovarium. *Branchiæ* very large, quite semicircular, inner one a little the larger, free two-thirds the length of the abdominal sack. *Palpi* large, pendant, suboval, united nearly half way down the posterior edges. *Mantle* thin, slightly thickened on the posterior border. *Branchial opening* small, with small brownish papillæ. *Anal opening* rather large, with numerous small, brownish papillæ on the inner edges. *Super-anal opening* rather small, colored on the inner edges, united below. Color of the mass whitish.

Remarks.—Two specimens only were received by me. That which is figured is the more imperfect of the two. The better one was received from Dr. Neisler after the drawing was made. In both, the points of the beaks for some distance are worn square off, so that the character of this portion cannot be given. It is evident they were high and massive. The specimen from Dr. Neisler has a rich salmon colored nacre, quite satin-like; that from Mr. Plant is white, with a slight disposition to a salmon tint near the margin. It is near to *Hanleyanus* (nobis) in outline, but is rather more triangular, has a higher and more angular umbonial slope, has a black and polished epidermis, and is without colored spots or bands.

UNIO PLANTII. Pl. 21, fig. 76.

Testâ lævi, regulariter ellipticâ, valdè compressâ, inequilaterali; valvulis subcrassis, anticè crassioribus; natibus prominulis; epidermide tenebroso-castaneâ, micante, eradiatâ; dentibus cardinalibus parvisculis, subdepressis, obtuso-conicis crenulatisque; lateralibus prælongis, subcrassis curvisque; margaritâ salmonis colore tinctâ et valdè iridescente.

Shell smooth, regularly elliptical, very much compressed, inequilateral; valves

rather thick, thicker before; beaks a little prominent; epidermis dark chestnut, without rays and shining; cardinal teeth rather small, low, obtusely conical and crenulate; lateral teeth very long and curved; nacre salmon colored and very iridescent.

Proc. Acad. Nat. Sci., 1857, p. 171.

Hab.—Flint river, near Macon, Georgia. J. C. Plant.

My cabinet and cabinet of Mr. Plant.

Diam. 1·1, Length 2·2, Breadth 3·7 inches.

Shell smooth, regularly elliptical, very much compressed, inequilateral; substance of the shell rather thick, thicker before; beaks a little prominent; ligament long, large and dark brown; epidermis dark chestnut, shining, without rays, with distant broad lines of growth; umbonial slope very low and rounded; posterior slope compressed and somewhat raised; cardinal teeth rather small, obtusely conical, crenulate, disposed to be double in the right as it is in the left valve; lateral teeth very long, curved and corrugate; anterior cicatrices distinct and well impressed; posterior cicatrices large, confluent and not deeply impressed; dorsal cicatrices placed nearly in the centre of the cavity of the beaks; pallear cicatrix large, well impressed and distant from the margin; cavity of the shell very shallow and very wide; cavity of the beaks very shallow and rounded; nacre salmon color and very iridescent.

Soft Parts.—*Branchial uterus* not charged, but ova were found in the ovarium. *Branchiæ* large, rounded below, inner one much the larger, free nearly the whole length of abdominal sack. *Palpi* very small, subtriangular, free nearly the whole length of the posterior edges. *Mantle* thin, thicker along the edge. *Branchial opening* rather large, with small brownish papillæ. *Anal opening* small, with numerous small brownish papillæ on the inner edges. *Super-anal opening* very large, slightly colored on the inner edges and united at the lower part. Color of the mass whitish.

Remarks.—Unfortunately only a single specimen was received. It is a very interesting species, and I am happy to dedicate it to J. C. Plant, Esq., of Macon, to whom I am indebted for many fine and new species in this family. It is of a very regular ellipse of nearly four inches in the axis major and two and a quarter in the axis minor. It is remarkably compressed. In general character and in outline it is near to *Stonensis* (nobis), and inclines towards *ligamentinus* Lam. It is not so much compressed, nor so transverse as the former, but is more compressed than the latter. This specimen is entirely without rays. Younger and more perfect ones may have them. The beaks are much eroded and therefore the characters cannot be made out.

UNIO SUDUS. Pl. 21, fig. 77.

Testâ lævi, ellipticâ, subinflatâ, posticè obtusè angulatâ, inæquilaterali; valvulis subtenuibus, anticè crassioribus; natibus subprominentibus, ad apices undulatis; epidermide luteolâ, valdè radiatâ, nitidâ; dentibus cardinalibus parvis, compressis, lamellatis, in utroque valvulo duplicibus; lateralibus sublongis, lamellatis subrectisque; margaritâ vel albâ vel salmonis colore tinctâ et valdè iridescente.

Shell smooth, elliptical, rather inflated, obtusely angular behind, inequilateral; valves rather thin, thicker before; beaks rather prominent, undulate at the tips; epidermis yellowish, very much radiated, polished; cardinal teeth small, compressed, lamellar, double in both valves; lateral teeth rather long, lamellar and nearly straight; nacre white or salmon color and very iridescent.

Proc. Acad. Nat. Sci., 1857, p. 170.

Hab.—Dry Creek, near Columbus, Georgia, Bishop Elliott, and Macon, J. C. Plant.

My cabinet and cabinet of Bishop Elliott.

Diam. .7

Length 1,

Breadth 1.8 inches.

Shell smooth, elliptical, rather inflated, obtusely angular behind and regularly rounded before; substance of the shell rather thin, thicker before; beaks rather prominent, with small, irregular undulations at the tips; ligament small and light brown; epidermis yellowish, regularly radiated all over, the rays being green and interrupted, polished and with distant marks of growth; umbonial slope rather raised and rounded; posterior slope broad and slightly raised; cardinal teeth small, compressed, lamellar, double in both valves; lateral teeth rather long, lamellar and nearly straight; anterior cicatrices distinct and rather large; posterior cicatrices confluent; dorsal cicatrices in the centre of the cavity of the beaks; cavity of the shell rather deep and wide; cavity of the beaks rather shallow and subangular; nacre white or salmon color and very iridescent.

Soft Parts.—*Branchial uterus* occupying the posterior half of the outer branchiæ, and charged in large sacks like *U. cariosus* Say, the inferior edge being blackish. *Branchiæ* large, inner one the larger on the interior portion, nearly semicircular, free for a very short distance at the end of the abdominal sack. *Palpi* rather large, sub-oval and united at the upper part of the edges. *Mantle* thin, thickened at the margin, with numerous rather distant well defined papillæ for some distance below the branchial opening. *Branchial opening* large, with numerous brownish papillæ. *Anal opening* small, with very minute papillæ on the inner edges. *Super-anal opening* small, united for some distance below. Color of the mass whitish.

Embryonic shell is the form which belongs to the group of the pouch-shape and is somewhat elongate.

Remarks.—This is a beautiful, rather small species, near to *concausus* (nobis and *Prevostianus* (nobis). It is not quite so transverse as either. It is inflated like the

former, but its rays are more like the latter, which is less inflated. The teeth are more like those of *concurvus* than those of *Prevostianus*. The substance of the shell is about as thick as the former. Its bright and yellow epidermis makes a fine contrast to the beautiful green interrupted rays, which cover the whole disk. The figure is from a male. I have two females in alcohol, both of which have the posterior part of the shell very much enlarged and rounded on the umbonal slope. The *papillæ* on the margin extend from the *branchial opening* quite half way of the basal margin forming a remarkably fine fringe.

UNIO TETRICUS. Pl. 22, fig. 78.

Testâ lævi, oblongâ, valdè compressâ, posticè biangulatâ, inequilaterali; valvulis crassiusculis; natibus prominulis; epidermide rugoso-striatâ, tenebroso-fuscâ, obsoletè radiatâ; dentibus cardinalibus parvis, conicis, crenulatis, in utroque valvulo subduplicibus; lateralibus sublongis subcurvisque; margaritâ purpurascens et iridescente.

Shell smooth, oblong, very much compressed, biangular behind, inequilateral; valves a little thickened; beaks a little prominent; epidermis roughly striate, dark brown and obscurely radiate; cardinal teeth small, conical, crenulate, and in both valves somewhat double; lateral teeth rather long and somewhat curved; nacre purple and iridescent.

Proc. Acad. Nat. Sci., 1857, p. 170.

Hab.—Flint River, near Albany, Georgia. Bishop Elliott.

My cabinet and cabinet of Bishop Elliott.

Diam. .6,

Length 1,

Breadth 1.9 inches.

Shell smooth, oblong, very much compressed, biangular behind, inequilateral; substance of the shell a little thickened; beaks slightly prominent; ligament rather long and thin; epidermis roughly striate, very dark brown and very obscurely rayed; umbonal slope slightly raised and obtusely angular; cardinal teeth small, conical, somewhat erect, crenulate and disposed to be double in the right as it is in the left valve; lateral teeth rather long and somewhat curved; anterior cicatrices distinct and well impressed; posterior cicatrices large and confluent; dorsal cicatrices nearly in the centre of the cavity of the beaks; cavity of the shell shallow and wide; cavity of the beaks very shallow and obtusely angular; nacre purple and very iridescent.

Soft Parts.—*Branchial uterus* occupies the whole length of the outer leaf of the branchiæ. *Branchiæ* large, the inner one much the larger, free nearly the whole length of the abdominal sack. *Palpi* rather small, suboval, attached only at the upper part of the posterior edges. *Mantle* thin, thickened at the margin. *Branchial opening* large, with numerous small deep brown papillæ on the inner edges. *Anal opening* rather large, with numerous very small papillæ on the edges. *Super-anal opening* rather large, and united below. Color of the mass whitish.

Remarks.—In outline this small species is very close to *similis* (nobis), but it is a

smaller and thinner shell, more compressed and has not the well defined rays. It is allied to *nigellus* (nobis) and *tortivus* (nobis), but is not emarginate at the base like the latter, nor has it the swollen umbonial slope nor the black polished epidermis of it. It has a more regular biangular posterior margin than either. In the general character of the soft parts there is a close alliance to *nigellus*. The posterior ends of the branchiæ do not reach the margin, but are attached to it by a filamentous process. The ova transferred to the branchial uterus were not matured, and therefore the embryonic form could not be ascertained.

UNIO SUBNIGER. Pl. 22, fig. 79.

Testâ lævi, ellipticâ, subcompressâ, inequilaterali, posticè obtusè angulatâ; valvulis subcrassis; natibus prominulis; epidermide tenebroso-fuscâ, nigricante, striatâ, eradiatâ; dentibus cardinalibus parviusculis, erectis, acuminatis crenulatisque; lateralibus prælongis, lamellatis curvisque; margaritâ albâ et iridescente.

Shell smooth, elliptical, rather compressed, inequilateral, obtusely angular behind; valves rather thick; beaks a little prominent; epidermis dark brown, nearly black, striate, without rays; cardinal teeth rather small, erect, pointed and crenulate; lateral teeth very long, lamellar and curved; nacre white and iridescent.

Proc. Acad. Nat. Sci., 1857, p. 172.

Hab.—Flint River, near Macon, Georgia. J. C. Plant.

My cabinet and cabinet of Mr. Plant.

Diam. 1·1,

Length 2,

Breadth 3·6 inches.

Shell smooth, elliptical, rather compressed, inequilateral, obtusely angular behind, obliquely rounded before, nearly straight on the basal line, substance of the shell rather thick; beaks a little prominent; ligament long, thick and dark brown; epidermis dark brown, nearly black, transversely very much striate, without rays; umbonial slope raised and slightly angular; cardinal teeth rather small, compressed, erect, pointed and very much crenulate; lateral teeth very long, lamellar and curved; anterior cicatrices large, distinct and well impressed; posterior cicatrices large and confluent; dorsal cicatrices placed a little above the centre of the cavity of the beaks; cavity of the shell rather shallow and wide; cavity of the beaks shallow and rounded; nacre white and iridescent.

Soft Parts.—*Branchial uterus* occupies the whole width of the outer leaf of the Branchia. *Branchiæ* rather small, the inner one much the larger, very slightly curved below, free nearly the whole length of the abdominal sack. *Palpi* rather small, very transverse, subtriangular, united nearly half way down the posterior edges. *Mantle* rather thick, thickened on the border. *Branchial opening* rather small, with small brownish papillæ on the inner edges. *Anal opening* very small, with numerous small brownish papillæ. *Super-anal opening* very large, the edges uncolored, united below. Color of the mass dirty white.

Remarks.—A single specimen only, a female, is before me. The branchial uterus was charged the whole width with ova not matured, so that the embryonic form could not be described. In outline this species is near to *fumatus* (nobis) and *subflavus* (nobis) as well as to *delodontus*, Lam. It is larger and even darker than the first. It is also allied to *Plantii* (nobis), but is not so regularly elliptical and not so much impressed. It differs also in the color of the epidermis, the *Plantii* being of a dark chestnut color.

UNIO OBFUSCUS. Pl. 22, fig. 80.

Testâ lævi, regulariter ellipticâ, inflatâ, posticè rotundatâ, inequilaterali; valvulis subtenuibus; natibus subprominentibus; epidermide tenebroso-fuscâ, obsoletè radiatâ, subpolitâ; dentibus cardinalibus subcompressis, crenulatis, in utroque valvulo duplicibus; lateralibus lamellatis, sublongis subcurvisque; margaritâ paulisper salmonis et valdè iridescente.

Shell smooth, regularly elliptical, inflated, rounded behind, inequilateral; valves rather thin; beaks somewhat prominent; epidermis dark brown, obscurely rayed and somewhat polished; cardinal teeth rather compressed, crenulate, double in both valves; lateral teeth lamellar, rather long and somewhat curved; nacre light salmon color and very iridescent.

Proc. Acad. Nat. Sci., 1857, p. 172.

Hab.—Flint River, near Macon, Georgia. J. C. Plant.

My cabinet and cabinet of Mr. Plant.

Diam. .6, Length .9, Breadth 1.6 inches.

Shell smooth, regularly elliptical, inflated, rounded behind, striate and somewhat sulcate before; substance of the shell rather thin; beaks somewhat prominent; ligament rather short, thin and dark brown; epidermis dark brown, obscurely rayed, somewhat polished and with distant marks of growth; umbonial slope slightly raised and rounded; cardinal teeth rather compressed, crenulate, erect and double in both valves; lateral teeth lamellar, rather long and somewhat curved; anterior cicatrices distinct and well impressed; posterior cicatrices confluent; dorsal cicatrices situated nearly across the centre of the cavity of the beaks; cavity of the shell rather deep and rounded; cavity of the beaks rather deep and subangular; nacre light salmon color and very iridescent.

Soft Parts.—*Branchial uterus* not charged, but ova were found in the ovarium. *Branchiæ* large, nearly semicircular, inner one much the larger, oblique at posterior margin, united to the abdominal sack the whole length. *Palpi* rather large, suboval, united on the posterior edges. *Mantle* very thin, thickened and colored on the inferior border. *Branchial opening* large, with numerous brownish papillæ on the inner edges. *Super-anal opening* small, slightly colored on the inner edges and united below. Color of the mass whitish.

Remarks.—Two specimens only of this small species were received. The smaller

one is about half the size of that figured. It is a graceful little species, with a remarkably rich satin-like nacre. In the left valve the anterior section of the cardinal tooth is much the larger. In the right valve it is very small, and there is a disposition in it to be trifid. In outline this species is of a very regular ellipse and is allied on one side to *gracilior* (nobis), and on the other to *glans* (nobis). It is rather smaller and thicker than the former, and larger and not by any means so thick as the latter. It would be much more likely to be confounded with the former than the latter. The epidermis is dark brown, smooth and shining like *gracilior*, and is not so dark and rough as *glans*.

UNIO PURPURELLUS. Pl. 23, fig. 81.

Testâ lævi, oblongâ, subinflatâ, ad latere planulatâ, ad basim subemarginatâ, posticè biangulatâ, valde inequilaterali; valvulis crassiusculis; natibus prominulis; epidermide tenebroso-fuscâ et posticè obsoletè radiatâ; dentibus cardinalibus parvis, crenulatis, in utroque valvulo subduplicibus; lateralibus prælongis, lamellatis subcurvisque; margaritâ purpureâ et valde iridescente.

Shell smooth, oblong, somewhat inflated, flattened at the sides, subemarginate at the base, biangular behind; very inequilateral; valves a little thick; beaks somewhat prominent; epidermis dark brown and obsoletely rayed behind; cardinal teeth small, crenulate and double in both valves; lateral teeth very long, lamellar and somewhat curved; nacre purple and very iridescent.

Proc. Acad. Nat. Sci., 1857, p, 171.

Hab.—Flint River, near Albany, Georgia. Bishop Elliott.

My cabinet and cabinet of Bishop Elliott.

Diam. .5,

Length .7,

Breadth 1.4 inches.

Shell smooth, oblong, rather inflated, flattened at the sides or impressed, subemarginate at the base, obtusely biangular behind and very inequilateral; substance of the shell thick, thicker before; beaks somewhat prominent; ligament rather long, thin and light brown; epidermis dark brown, obsoletely rayed behind and with not very distant lines of growth; umbonial slope much raised and rounded, posterior slope slightly raised and roughly striate or wrinkled; cardinal teeth small, striate, crenulate, pointed and double in both valves; lateral teeth very long, lamellar, rather thick and somewhat curved; anterior cicatrices small, distinct and well impressed; posterior cicatrices confluent and slightly impressed; dorsal cicatrices deeply impressed and placed under the plate posterior to the cardinal tooth; cavity of the shell rather deep and wide; cavity of the beaks shallow and obtusely angular; nacre purple and very iridescent.

Soft Parts.—*Branchial uterus* occupies the whole width of the outer leaf of the branchia. *Branchiæ* rather large, the inner rather the larger, free nearly the whole length of the abdominal sack. *Palpi* rather large, subtriangular, united a short distance on the posterior edges. *Mantle* thin, thickened and slightly colored on the margin. *Branchial opening* small, with a few brownish papillæ. *Anal opening* large,

with numerous small dark brown papillæ on the inner edges. *Super-anal opening* long, united slightly below. Color of the mass whitish.

Remarks.—This is a small oblong, transverse species in outline, and belongs to a small group of which *tetricus*, *denigratus* and *tortivus* naturally belong. It is perhaps a more solid shell than either, and more cylindrical. The four specimens before me all have purple nacre. The specimen figured is a good one, and it can easily be distinguished from the allied species mentioned above; but some of the others are old and worn, and look very much like *tortivus*. The embryonic form is very near to that of *tortivus*; perhaps a little more elongate. Being so near to it, I have not thought it necessary to draw it or describe it.

UNIO WOODWARDIANUS. Pl. 23, fig. 82 and pl. 29, fig. 103.

Testâ lævi, triangulari, ad apices crassis, posticè biangulata, ad latere planiusculâ inæquilaterali; valvulis crassis, anticè crassioribus; natibus elevatis planulatisque; epidermide luteo-olivâ, striatâ, radiis maculatis; dentibus cardinalibus parviusculis crassisque; lateralibus percrassis, crenulatis rectisque; margaritâ argenteâ et iridescente.

Shell smooth, triangular, thickened at the beaks, biangular behind, inequilateral; valves thick, thicker before; beaks raised and flattened; epidermis yellowish olive, striate, with interrupted rays; cardinal teeth rather small and thick; lateral teeth very thick, crenulate and straight; nacre silver white and very iridescent.

Proc. Acad. Nat. Sci., 1857, p. 170.

Hab.—Etowah and Connasauga Rivers, Cass County, Georgia. Bishop Elliott and Rev. G. White.

My cabinet and cabinets of Bishop Elliott and Mr. White.

Diam. .8, Length 1.2, Breadth 1.8 inches.

Shell smooth, triangular, thick at the beaks, obtusely biangular behind, flattened at the sides, inequilateral; substance of the shell thick, thicker before; beaks raised and flattened; ligament very short, very thick, reddish brown; epidermis yellowish olive, striate, with dark interrupted rays intercepted by the marks of growth which are very close; umbonial slope raised into an obtuse angle; posterior slope depressed, usually without any rays, but with two slightly depressed furrows from beak to margin on each valve; cardinal teeth rather small and thick, pointed, striate and crenulate; lateral teeth oblique, very thick and massive, granulate, crenulate, straight, abrupt at the end and remarkably arched; anterior cicatrices distinct and deeply impressed; posterior cicatrices distinct and well impressed; dorsal cicatrices small, and placed under the plate close to the cardinal tooth; cavity of the shell not deep, rather wide; cavity of the beaks not deep, but obtusely angular; nacre silver white and very iridescent.

Soft parts.—Pl. 29, fig. 103. *Branchial uterus* is placed along the outer leaf in a very unusual manner. It is nearly similar to that in the *U. phaseolus*, Hild.*

* Figured by Mr. Say in Am. Conch. pl. 22, and by me in this volume, pl. 29, fig. 101.

The form of the branchial ovisack is club-shape, tapering toward the superior end and blunt at the lower one, which is terminated with a knob, and covered with a translucent membrane. These ovisacks are about three-tenths of an inch long and one-thirtieth wide,* attached by the point to the middle of the outer branchial leaf, the line of attachment running nearly the whole length in a zig-zag manner, which gives a folded form to the whole *branchial uterus*, the ovisack extending below the lower edge of the branchia. These ovisacks are blackish from the middle down to the end, where the knob-like termination is perfectly white, so that on looking at the ends of the folds, the whole edge has the appearance of a string of pearls. Under the microscope may be seen at the end of each sack a white bell-shaped substance in the interior. These folds cause the length of the lower edge of the outer branchiæ to be quite three times the length of the edge of the inner branchiæ. In my largest specimens the number of folds is sixteen on each of the outer leaves of the branchiæ. See pl. 29, fig. 103. *Branchiæ* free quite half the length of the abdominal sack.† The inner branchiæ much larger than the outer ones. They are all large and semicircular below. *Palpi* small and suboval. *Mantle* thin, with a delicate border all round, slightly colored. *Branchial opening* rather large with numerous, thickly set, small brownish papillæ. *Anal opening* large with numerous very small brown papillæ on the inner edges. *Super-anal opening* rather long, colored on the inside, and very slightly attached below.

Embryonic Shell is elongate pouch-shape.‡

Remarks.—This is a remarkably interesting species owing to its rare form of *branchial uterus*, which is constructed on the same plan with *U. phaseolus*, as mentioned above; but being a much smaller species the number of folds of the uterus is by no means so great. In outline this species is nearly allied to *Formanianus* (nobis), but it is more triangular. It differs also in the rays which are maculate and not capillary. It is also nearly allied to *phaseolus* in its general outward phase, being yellowish and maculate, but it is by no means transverse nor so flat-sided as that shell. It is to be regretted that the soft parts of the *Formanianus* and several allied species, viz.: *Greenii* Con., &c., have not been observed, as they are likely to possess the same peculiar *branchial uterus*. The teeth of *Woodwardianus* are remarkable for the high and subangular arch formed between them. This character is very striking. It is with pleasure I dedicate this very interesting mollusc to S. P. Woodward of the British Museum, author of the excellent "Treatise on Recent and Fossil Shells."

UNIO DENIGRATUS. Pl. 23, fig. 83.

Testâ lævi, oblongâ, subinflâtâ, ad latere planulatâ, inæquilaterali; valvulis subtenuibus, anticè crassioribus; natibus prominulis, ad apices undulatis; epidermide nigricante, obsoletè radiatâ et micante; dentibus

* See pl. 5, fig. 16 a.

† One specimen out of 14 was free only a short distance.

‡ See pl. 5, fig. 16.

cardinalibus parvis, pyramidatis crenulatisque; lateralibus sublongis, lamellatis subcurvisque; margaritâ vel purpureâ vel salmonis colore tinctâ et iridescente.

Shell smooth, oblong, rather inflated, flattened at the side, inæquilateral; valves rather thin, thicker before; beaks a little prominent, undulate at the tips; epidermis blackish, shining and obscurely rayed; cardinal teeth small, pyramidal and crenulate; lateral teeth rather long, lamellar and somewhat curved; nacre either purple or salmon color and iridescent.

Proc. Acad. Nat. Sci., 1857, p. 171.

Hab.—Streams near Columbus, Georgia. Bishop Elliott.

My cabinet and cabinet of Bishop Elliott.

Diam. .5, Length .8, Breadth 1.5 inches.

Shell smooth, oblong, rather inflated, flattened at the sides, inequilateral, rounded behind; substance of the shell rather thin, a little thicker before; beaks a little prominent, finely undulate at the tips; ligament short, somewhat thick and light brown; epidermis blackish, shining, obscurely rayed and with rather distant marks of growth; umbonial slope raised and much rounded: cardinal teeth small, pyramidal, crenulate, compressed and double in both valves; lateral teeth rather long, lamellar and somewhat curved; anterior cicatrices distinct; posterior cicatrices confluent; dorsal cicatrices placed under the plate immediately behind the cardinal tooth; cavity of the shell rather deep and wide; cavity of the beaks rather shallow and subangular; nacre purple and salmon color.

Soft parts.—*Branchial uterus* not charged, but ova were found in the ovarium. *Branchiæ* free nearly the whole length of abdominal sack, large, rounded below, inner one much the larger. *Palpi* rather small, subangular, united above on the posterior edges. *Mantle* thickened and double on the posterior margin, colored at the siphonal openings and truncate behind. *Branchial opening* very large, with numerous small brown papillæ on the inner edges. *Anal opening* large, with very minute, brown papillæ on the inner edges. *Super-anal opening* rather small, colored within and slightly united below. Color of the mass dirty white.

Remarks.—This little, very dark brown or blackish species, is very nearly allied to *nigellus* (nobis). It is rather more transverse, not quite so high on the umbonial slope, nor has it so smooth, dark and polished an epidermis. One of the youngest specimens is perfect at the beaks and displays a number of irregular undulations very much like those of *complanatus*. This young one is light brown and has well marked rays on the posterior half, while the adults have very obscure ones or none.

UNIO RADIANS. Pl. 23, fig. 84.

Testâ lævi, ellipticâ, subinflatâ, inæquilaterali, posticè rotundatâ; valvulis subtenuibus, anticè crassioribus, natibus prominulis, ad apices undulatis; epidermide luteâ, politâ, valdè radiatâ; dentibus cardinalibus subgrandibus, erectis, subconicis crenulatisque; lateralibus sublongis, lamellatis subrectisque; margaritâ vel albâ vel rosaceâ et valdè iridescente.

Shell smooth, elliptical, rather inflated, inequilateral, rounded behind; valves rather thin, thicker before; beaks a little prominent, undulate at the tips; epidermis yellow, polished, very much radiated; cardinal teeth rather large, erect, somewhat conical and crenulate; lateral teeth rather long, lamellar and nearly straight; nacre either white or rose-color and very iridescent.

Proc. Acad. Nat. Sci., 1857, p. 32.

Hab.—Othcalooga Creek, Gordon County, Georgia. Bishop Elliott.

My cabinet and cabinet of Bishop Elliott.

Diam. .7,

Length 1.1,

Breadth 1.8 inches.

Shell smooth, regularly elliptical, rather inflated, inequilateral, rounded behind; substance of the shell rather thin, thicker before; beaks a little prominent, with a few rugose undulations at the tips; ligament rather short, somewhat thin and brown; epidermis yellow, polished, very much radiated and with distant marks of growth; umbonial slope raised and very much rounded; posterior slope not much raised and quite broad; cardinal teeth rather large, erect, somewhat conical and crenulate, disposed to be double in both valves; lateral teeth rather long, lamellar and nearly straight; anterior cicatrices distinct and moderately well impressed; posterior cicatrices confluent; dorsal cicatrices placed across the centre of the cavity of the beaks; cavity of the shell rather deep and rounded; cavity of the beaks shallow and subangular; nacre white or rose-color and very iridescent.

Soft parts.—*Branchial uterus* occupies the posterior half of the outer branchiæ, very much like *U. cariosus* Say. The two specimens under examination have, the one nine the other twelve branchial ovisacks charged, which are rather long and very wide. They were full of embryos ready to be extruded. The lower border of these branchial ovisacks is very much enlarged and of a purplish tint. *Branchiæ* rather large and rounded below, the inner ones much the larger before, united the whole length of abdominal sack. *Pulpi* rather small, thin, subtriangular and united above at the posterior edges. *Mantle* thin, much thickened on the margin, which, below the branchial opening, is deep brown and furnished with large dark papillæ to the middle of the basal line. *Branchial opening* rather large, with numerous small, dark papillæ on the inner edges. *Anal opening* rather small, with numerous very small dark papillæ. *Super-anal opening* large, dark inside and united below for a short distance. Color of the mass whitish.

Embryonic shell is elongate pouch-shape, rather flattened on the side and very closely resembling that of *U. rutilans* (nobis,) pl. 5, fig. 4.

Remarks.—I have the advantage of having four specimens of this pretty little species before me. It is nearly allied to *concausus* (nobis), being yellow, having dark green rays and of nearly the same outline, but it may be easily distinguished from it by its being a smaller species, the beaks being more terminal and the form inclining more to obovate. The rays too are broader and more distinct. The cardinal

teeth are thicker and not so oblique. The specimen figured has more and broader rays than either of the others. The rays in all the four specimens are disposed to be more or less interrupted, but not strikingly so. This species is also somewhat allied to *Cumberlandianus* (nobis), but it is a little larger, more inflated and not quite so transverse as that species. The undulations of the beaks are somewhat eroded at the tips, but enough remain in the younger specimens to denote that they consist of two or three rather large irregular nodulous folds.

UNIO PENICILLATUS. Pl. 23, fig. 85.

Testâ posticâ plicatâ, subellipticâ, subinflatâ, posticâ subbiangulatâ, inæquilaterali; valvulis crassiusculis, anticâ crassioribus; natibus subprominentibus, ad apices minutè undulatis; epidermide luteolâ, radiis penicillatis indutis, politâ; dentibus cardinalibus crassiusculis, crenulatis, subpyramidatis; lateralibus sublongis, subcrassis subrectisque; margaritâ vel albâ vel roseâ vel salmonis colore tinctâ et valdè iridescente.

Shell plicate behind, subelliptical, rather inflated, biangular behind, inequilateral; valves a little thick, thicker before; beaks a little prominent and minutely undulate at the tips; epidermis yellowish, polished and covered with pencilled rays; cardinal teeth somewhat thick, crenulate and rather pyramidal; lateral teeth long, somewhat thick and straight; nacre either white, rose or salmon color and very iridescent.

Proc. Acad. Nat. Sci., 1857, p. 171.

Hab.—Chattahoochee, near Columbus, Georgia, Dr. Boykin, and near Atlanta, Bishop Elliott. Flint River, near Albany, Georgia, Bishop Elliott and Rev. G. White.

My cabinet and cabinets of Bishop Elliott and Mr. White.

Diam. .5, Length .7, Breadth 1.3 inches.

Shell plicate behind, ellipsoidal, rather inflated, somewhat biangular behind, inequilateral, substance of the shell a little thick, thicker before; beaks a little prominent, with numerous small undulations at the tips; ligament rather short, thin and dark brown; epidermis yellowish, polished and covered with interrupted pencilled rays, which are more conspicuous on the posterior half; umbonial slope slightly raised and rounded; posterior slope rather narrow and covered with small, rather oblique and slightly curved folds; cardinal teeth somewhat thick, crenulate and rather pyramidal; lateral teeth long, somewhat thick and straight; anterior cicatrices all three distinct and well impressed; posterior cicatrices distinct; dorsal cicatrices under the plate behind the cardinal tooth; cavity of the shell rather shallow; cavity of the beaks shallow and rounded; nacre either white, rose or salmon color, but rarely rose color.

Soft parts.—*Branchial uterus* occupies about two-thirds the breadth of the outer branchiæ, and has about twenty large ovisacks which are very much enlarged below, and seem at first sight to extend the whole breadth; they extend much below the line of the branchial leaf.* *Branchiæ* rather large, rounded below, inner one the larger,

* The specimen from Flint River had only the middle of the branchia occupied by 5 or 6 ovisacks.

distant marks of growth; umbonial slope somewhat raised and rounded; cardinal teeth rather large, slightly elevated, striate and crenulate; lateral teeth short, thick, granulate and somewhat curved; anterior cicatrices distinct and well impressed; posterior cicatrices distinct and somewhat impressed; dorsal cicatrices under the plate behind the cardinal tooth; cavity of the shell rather deep and irregularly rounded; cavity of the beaks rather shallow and very obtusely angular; nacre white or pale salmon color and iridescent.

Soft parts.—*Branchial uterus* not charged, but ova were found in the ovarium. *Branchiæ* small, thin, nearly semicircular, inner one much the larger, free about half the length of the abdominal sack. *Palpi* small and thin. *Branchial opening* small, with small papillæ on the inner edges. *Anal opening* rather large, with numerous very minute papillæ. *Super-anal opening* long, seemed not to be united below, but the specimen was torn in opening it.

Remarks.—A very small species, the figure nearly an inch and a half wide, being made from the largest of seven or eight specimens which have come into my possession. It usually has but two marks of growth, the half grown ones showing a single well marked line. It is nearly allied to *Ravenellianus* (nobis) in outline and in size. It is a little browner and more transverse, and the nacre is inclined to be salmon color, which is not the case with *Ravenellianus*. The nacre is very much thickened posteriorly, and the line of increase is marked by a thickening which commences in the cavity of the beak, and sweeping round anteriorly, terminates about the middle of the basal margin.

UNIO ROSWELLENSIS. Pl. 24, fig. 87.

Testâ lævi, oblongâ, subcompressâ, ad latere compressâ, posticè biangulatâ, valdè inæquilaterali; valvulis subcrassis; natibus subprominentibus; epidermide tenebroso-fuscâ, striatâ; dentibus cardinalibus subgrandibus, crenulatis, in utroque valvulo subduplicibus; lateralibus prælongis subrectisque; margaritâ vel purpureâ vel salmonis colore tinctâ et valdè iridescente.

Shell smooth, oblong, rather compressed, biangular behind; flat at the sides, very inequilateral; valves rather thick, beaks rather prominent; epidermis dark brown, striate; cardinal teeth rather large, crenulate and somewhat double in both valves; lateral teeth very long and nearly straight; nacre either purple or salmon color and very iridescent.

Proc. Acad. Nat. Sci., 1858, p. 165

Hab.—Chattahoochee River, at Roswell, Cobb County, Georgia. N. A. Pratt, Jr.
My cabinet and cabinet of Mr. Pratt.

Diam. .8, Length 1.5, Breadth 3.1 inches.

Shell smooth, oblong, rather compressed, biangular behind, flat at the sides, very inequilateral, broadly rounded before; substance of the shell rather thick; beaks rather prominent; ligament long, somewhat thick and light brown; epidermis dark

brown, darker before and behind, with somewhat close marks of growth; umbonial slope rather low and subbiangular; posterior slope somewhat raised, with two iridescent impressed lines on each from the beaks to the margin; cardinal teeth rather large, crenulate, striate, nearly perpendicular and disposed to be double in the right as it is in the left valve; lateral teeth very long, nearly straight, finely granulate and enlarged toward the end; anterior cicatrices large, well impressed and distinct; posterior cicatrices large and confluent; dorsal cicatrices placed above in the centre of the cavity of the beaks; cavity of the shell very shallow and very wide; cavity of the beaks very shallow and rounded; nacre purple or salmon color and very iridescent.

Soft parts.—*Branchial uterus* not charged, but well developed ova were found in the ovarium. *Branchiæ* very large, thin, inner ones larger before, free nearly the whole length of the abdominal sack. *Palpi* small, nearly transverse, suboval, attached nearly the whole length of the posterior edges. *Mantle* thin, slightly colored on the lower edge. *Branchial opening* rather large, with numerous small brownish papillæ on the inner edges. *Anal opening* large, with numerous small dark brown papillæ on the inner edges. *Super-anal opening* long, colored within and united below. Color of the mass whitish.

Remarks.—There were five specimens received from Mr. Pratt, in alcohol, but none had ova in the branchial uterus, which, therefore, cannot be described. This species belongs to the *complanatus* group. In outline it is near to *Roanokensis* (nobis) and *Neusensis* (nobis). It is by no means so large a species as the former, nor so thick; but it is larger than the latter. It has the broad truncate posterior margin as they both have. It is most closely allied to *Neusensis*, but may be distinguished by its not being so high on the umbonial slope, and not being so much compressed down the middle of the disk. The *Neusensis* is also a more solid shell, and the nacre is usually of a strong deep purple, while *Roswellensis* is more disposed to be salmon color. In the mature individuals there are no rays visible, but in a young specimen obscure rays are observable on the sides.

UNIO PRATTI. Pl. 24, fig. 88 and 88a.

Testâ lævi, ellipticâ, subinflatâ, posticè obliquè et anticè regulariter rotundatâ, inequilateralî; valvulis subtenuibus, anticè crassioribus; natibus subprominentibus, crassè undulatis; epidermide tenebrosâ, valdè radiatâ; dentibus cardinalibus parviusculis, crenulatis, obliquis, in utroque valvulo duplicibus; lateralibus sublongis subrectisque; margaritâ albâ et valdè iridescente.

Shell smooth, elliptical, rather inflated, obliquely rounded behind and rounded before, inequilateral; valves rather thin, thicker before; beaks somewhat prominent, thickly undulate; epidermis very dark, very much radiated; cardinal teeth rather small, crenulate, oblique and double in both valves; lateral teeth rather long and nearly straight; nacre white and very iridescent.

Proc. Acad. Nat. Sci., 1858, p. 166.

Hab.—Chatahoochee River, at Roswell, Cobb County, Georgia. N. A. Pratt, Jr., and J. Postell.

My cabinet and cabinets of Mr. Pratt, Mr. Postell and Dr. Lewis.

Diam. .5, Length .9, Breadth 1.3 inches.

Shell smooth, elliptical, rather inflated, obliquely rounded behind and regularly rounded before, straightened at the base, inequilateral; substance of the shell rather thin, thicker before; beaks somewhat prominent, with four or five large undulations at the tip; ligament short, thin and light brown; epidermis very deep olive brown, with very regular dark green rays over the whole disk; cardinal teeth rather small, crenulate, oblique and double in both valves; lateral teeth rather long and nearly straight; anterior cicatrices distinct and well impressed; posterior cicatrices confluent and lightly impressed; dorsal cicatrices in an oblique line above the cavity of the beaks; cavity of the shell rather deep and rounded; cavity of the beaks rather deep and subangular; nacre white and very iridescent.

Soft parts.—Pl. 24, fig. 88 a. *Branchial uterus* situated towards the posterior end of the outer leaf, and consists of five or six sacks on each. These are distended, and protrude a little below the edge of the branchial leaf. *Branchiæ* large, nearly semicircular, the inner ones much the larger. The two inner ones become united for one-fifth of an inch on the inferior border, towards the posterior end and immediately under the branchial uteri of the outer leaves. This union continues to the upper edges of the branchia, and therefore forms a blind sack before and behind the junction. Posteriorly to this junction of the two inner leaves of the *branchiæ*, the two outer ones become united on each side to the inner ones, and remain so united to the posterior end.* The inner *branchiæ* are united to the abdominal sack the whole length, except at the point or very edge of the posterior retractor muscle of the foot. *Palpi* rather small, thickish, triangular, united only a short distance down the posterior edges. *Mantle* thin, dirty white, thick on the margin, having papillæ on the margin below the branchial opening. *Branchial opening* rather large, with numerous, small, brownish papillæ. *Anal opening* small, with minute brownish papillæ. *Super-anal opening* rather large, brownish within and united below. Color of the mass dirty white.

Embryonic shell elongate pouch-shape. See pl. 5, fig. 8.

Remarks.—It is greatly to be regretted that a single specimen only of this species should have been received with the soft parts. I was struck at once, on opening it, with the singular construction of the juncture of the branchial leaves, which the artist has attempted to represent in the plate. It is so entirely different from anything I have ever seen in the examination of the immense numbers of this family

* If the peculiar anatomical structure here described be found to be persistent, then it must be considered, in any system founded on the structure of the soft parts, to be a distinct genus.

which I have dissected, that I have regarded it with great interest, and have endeavored to describe it with care. At my request it was examined with great minuteness by that excellent anatomist, my friend, Dr. Leidy, who pronounced this to be its normal character. I cannot yet, however, help feeling some misgiving as to its being a malformation, although in every respect the parts seem to be regular and present no appearance of cicatrices, as they would if the adhesion had been caused by a wound. In outline this specimen, which is figured, closely resembles the female of *fallax* (nobis), but it is more rounded and not quite so large. It differs too in the color of the epidermis, which is a deep olive brown, while *fallax* is a bright reddish brown. The specimen figured is the female described. I subsequently received some males, without the soft parts, which present a very regular ellipse. One from Mr. Postell is in fine condition, and measures one and one-sixteenth inches wide.

UNIO SPISSUS. Pl. 25, fig. 89.

Testâ lævi, ellipticâ, subventricosâ, posticè obtusè angulatâ, subæquilaterali; valvulis crassis; natibus prominulis; epidermide striatâ, rufo-fuscâ, obsoletè radiatâ; dentibus cardinalibus magnis, erectis, compressis, crenulatis, in utroque valvulo subduplicibus; lateralibus longis, crassis subcurvisque; margaritâ vel purpureâ vel salmonis colore tinctâ et iridescente.

Shell smooth, elliptical, rather ventricose, obtusely angular behind, nearly equilateral; valves thick; beaks somewhat prominent; epidermis striate, reddish brown, obsoletely radiated; cardinal teeth large, erect, compressed, crenulate, disposed to be double in both valves; lateral teeth long, thick and somewhat curved; nacre either purple or salmon color and iridescent.

Proc. Acad. Nat. Sci., 1859, p. 112.

Hab.—Satilla River, Wayne County, Georgia. T. C. Downie.

My cabinet and cabinet of Mr. Downie.

Diam. 1·6,

Length 2,

Breadth 3·1 inches.

Shell smooth, elliptical, rather ventricose, obtusely angular behind, nearly equilateral; substance of the shell thick; beaks somewhat prominent; ligament short, thick and dark brown; epidermis reddish brown, obscurely rayed, striate on the inferior half and smooth and shining above; umbonial slope very much raised, and obtusely angular; posterior slope very wide, roughly striate, with two raised rather large lines passing from beaks to posterior margin on each valve; cardinal teeth large, erect, compressed, crenulate, disposed to be double in both valves; lateral teeth long, very thick and somewhat curved; anterior cicatrices distinct and well impressed; posterior cicatrices confluent, large; dorsal cicatrices placed above the centre of the cavity of the beaks; cavity of the shell deep and rounded; cavity of the beaks somewhat deep and subangular; nacre either purple or salmon color and iridescent.

Remarks.—I owe to the kindness of Mr. Downie a number of this interesting species. It is near to *Lecontianus* (nobis), but is less transverse and more inflated. It is also near to *Downiei*, but not so oblique. It is generally purple in the nacre. Three out of fourteen were salmon color in the cavity of the shell, surrounded by purple; none were white. There are two slight emarginations on the posterior margin, caused by the two raised lines, which, passing from the beaks, terminate here. The dark rays, which are rather obscure, are broad and more discernible on the anterior half of the valves. The striæ on the inferior portion are rough, and the surface disposed to be in large furrows.

UNIO CHATTANOOGAENSIS. Pl. 25, fig. 90.

Testâ lævi, obliquâ, cuneatâ, subinflatâ, anticè decisâ; valvulis percrassis, anticè crassioribus; natibus elevatis, incurvatis, ferè terminalibus; epidermide luteo-olivâ, transversè virido-vittatâ; dentibus cardinalibus subgrandibus, compressis et erectis; lateralibus sublongis, crassis subcurvisque; margaritâ argenteâ et iridescente.

Shell smooth, oblique, wedge-shape, inflated before and compressed behind, truncate before; valves very thick, thicker before; beaks raised, incurved, almost terminal; epidermis yellowish olive, with green transverse bands; cardinal teeth rather large, compressed and raised; lateral teeth rather long, thick and somewhat curved; nacre silvery white and iridescent.

Proc. Acad. Nat. Sci., 1858, p. 166.

Hab.—Chattanooga, Tenn., T. Stewardson, M. D. Etowah River, Rev. G. White. Coosawattee and Oostenaula Rivers, Bishop Elliott.

My cabinet and cabinets of Bishop Elliott and Rev. G. White.

Diam. .9, Length 1.3, Breadth 2.1 inches.

Shell smooth, oblique, wedge-shape, inflated and truncate before and compressed and dilate behind; substance of the shell very thick, thicker before; beaks raised, incurved, almost terminal; ligament rather short, thick and light brown; epidermis yellowish olive, with green transverse bands on the upper part of the disk, striate below, and usually with somewhat distant marks of growth; umbonial slope flattened; posterior slope with a single impressed line on each valve; cardinal teeth somewhat large, compressed, raised, striate, almost terminal, direction nearly parallel with the lateral tooth; lateral teeth rather long, thick, enlarged at the end and somewhat curved; anterior cicatrices distinct and deeply impressed; posterior cicatrices distinct and well impressed; dorsal cicatrices placed above the centre of the cavity of the beaks; cavity of the shell very shallow and dilate; cavity of the beaks very shallow and rounded; nacre silvery white and iridescent.

Soft parts.—*Branchial uterus* ——. Could find no ova in the branchiæ or the ovarium of the only specimen I received. *Branchiæ* small, inner ones rather the larger, apparently free nearly the whole length of the abdominal sack. *Mantle* very thin.

Branchial opening small, with rather small brown papillæ. *Anal opening* large, with very small brownish papillæ. *Super-anal opening* —. Color of the mass whitish.*

Remarks.—This belongs to the group of which *clavus* Lam. may be considered the type, and to which *decisus* (nobis) and *patulus* (nobis) belong. It is most nearly allied to *decisus*, and to this species I referred the first specimens I received; but on getting more from different habitats I found the characters so persistent that I do not hesitate to assign a new name to it. It differs from *decisus* in being usually larger at the umbones, and in being more compressed and dilate on the posterior portion, also in having, with rare exceptions, well marked, green, transverse bands along the lines of growth, which the *decisus* has not, but on the contrary is obscurely rayed. I owe to different friends a fine suite of this species, young and old, but not one with perfect beaks, so that the character of the undulations might be noted: they are probably few and large. The youngest of those before me is not one-fifth the size of largest. All the youngest have transverse bands over the whole disk—the older ones do not possess it generally from the middle to the margin. A single old specimen with much eroded beaks presents no band. Some of the specimens have the bands much closer than in the figure; one of them having four where this has two. The direction of the cardinal teeth is very remarkable, being in a line parallel to the lateral teeth. The size of the cardinal teeth differs, the young having them smaller in proportion to the older.

UNIO DOWNIEI. Pl. 25, fig. 91.

Testâ lævi, ellipticâ, inflatâ, posticè subtriangulatâ, inæquilaterali; valvulis crassis; natibus prominulis; epidermide tenebroso-fuscâ, striatâ; dentibus cardinalibus subgrandibus, crenulatis, striatis, in utroque valvulo subduplicibus; lateralibus sublongis, crassis subcurvisque; margaritâ purpureâ et iridescente.

Shell smooth, inflated, somewhat biangular behind, inequilateral; valves thick; beaks somewhat prominent; epidermis dark brown, striate; cardinal teeth somewhat large, crenulate, striate and double in both valves; lateral teeth rather long, thick and somewhat curved; nacre purple and iridescent.

Proc. Acad. Nat. Sci., 1858, p. 166.

Hab.—Buck Lake, a bayou of Satilla River, Wayne County, Georgia. T. C. Downie and J. Postell.

My cabinet and cabinets of Mr. Downie and Mr. Postell.

Diam. 1·5,

Length 1·9,

Breadth 3·3 inches.

Shell smooth, inflated, somewhat biangular behind and regularly rounded before, inequilateral; substance of the shell thick, somewhat thickened before; beaks somewhat prominent; ligament rather short, thick and dark brown; epidermis dark

*The specimen was in a very bad condition, therefore some of the characters could not be made out satisfactorily, and some not at all.

brown striate, with indistinct lines of growth; umbonial slope raised and obtusely angular; posterior slope rather broad, with two raised lines on each valve from the beak to posterior margin; cardinal teeth somewhat large, crenulate, deeply striate and double in both valves; lateral teeth rather long, thick, granulate, thickened towards the end and somewhat curved; anterior cicatrices distinct and very deeply impressed; posterior cicatrices large, confluent and well impressed; dorsal cicatrices placed above the centre of the cavity of the beaks; cavity of the shell rather deep and wide; cavity of the beaks very shallow and rounded; nacre purple and iridescent.

Soft parts.—*Branchial uterus* not charged, but several had ova in ovaria. *Branchiæ* large and regularly rounded below, the inner one very much the larger, free about half the length of the abdominal sack. *Palpi* small, thin, subtriangular, united nearly half way down the posterior edges. *Mantle* thin, slightly colored. *Branchial opening* with small dark brown papillæ. *Anal opening* with very small dark brown papillæ. *Super-anal opening* long, slightly colored on the inner edges, united at the lower part. Color of the mass whitish.

Remarks.—Quite a large number of specimens were kindly sent to me by Mr. Downie, in alcohol, but none had ova in the branchial oviducts. The embryonic form could not, therefore, be observed, nor could the form of the branchial uterus. This species is nearly allied to *Lecontianus* (nobis), and forms one of a group of which the latter may be considered the type. The *Downiei* is more oval and not so smooth and shining on the side. The female is enlarged on the umbonial slope and the young are much rayed, while the old have no appearance of them. These rays are green. Two of the specimens had very distinct ventral cicatrices.

I dedicate this species to T. C. Downie, Esq., of Brunswick, Georgia, to whom I am indebted for many fine Georgian *Unionidæ*.

UNIO HAZLEHURSTIANUS. Pl. 26, fig. 92.

Testâ lævi, transversâ, subcylindraceâ, posticè biangulatâ, valdè inæquilaterali; valvulis subtenuibus; natibus prominulis; epidermide nigricante, subtilitè striatâ; dentibus cardinalibus parvis, compresso-conicis; lateralibus prælongis, lamellatis subrectisque; margaritâ purpurascente et valdè iridescente.

Shell smooth, transverse, subcylindrical, biangular behind, very inequilateral; valves rather thin; beaks a little prominent; epidermis blackish, minutely striate; cardinal teeth small, compressed and conical; lateral teeth very long, lamellar and nearly straight; nacre purplish and very iridescent.

Proc. Acad. Nat. Sci., 1858, p. 166.

Hab.—Satilla River, Camden County, Georgia. T. C. Downie, Esq.

My cabinet and cabinet of Mr. Downie.

Diam. .9,

Length 1.4,

Breadth 3 inches.

Shell smooth, transverse, subcylindrical, biangular behind, disposed to be abruptly rounded before, very inequilateral; substance of the shell rather thin; beaks slightly

prominent; ligament very long, rather thick and very dark brown; epidermis blackish, minutely striate, shining toward the beaks, with very indistinct marks of growth; umbonial slope slightly raised and very obtusely angular; posterior slope very long and but slightly raised; cardinal teeth small, compressed and conical; lateral teeth very long, lamellar and very slightly curved; anterior cicatrices distinct and well impressed; posterior cicatrices large, confluent and slightly impressed; dorsal cicatrices placed above the centre of the cavity of the beaks; cavity of the shell not deep, but very wide; cavity of the beaks very small, scarcely perceptible; nacre purplish and very iridescent.

Soft parts.—*Branchial uterus* probably occupies the whole width of the outer branchiæ, as ova were found partially deposited in nearly the whole of it. *Branchiæ* very wide, nearly straight on the lower margin, inner ones much the larger, free about one-half the length of abdominal sack. *Pulpi* rather large, transverse, angular at the posterior end and united nearly half way down the posterior edges. *Mantle* rather thin, brownish, with a thickened border, colored on the edge. *Branchial opening* very large, with numerous small brown papillæ. *Anal opening* with numerous, very minute brown papillæ on the inner edges. *Super-anal opening* very small and united below. Color of the mass whitish.

Remarks.—Among quite a number sent to me by Mr. Downie about one-half were females, but no one had the ova fully developed in the branchial uterus, so that the embryonic form was not ascertained. Some of the specimens were less cylindrical than the one figured. There were no very young individuals, and the beaks of all were more or less eroded. Some of the younger had obscure rays. The character of the undulations of the tips could not, therefore, be ascertained. In outline it is near to *naviculoides* (nobis), but it is more cylindrical and has a much darker epidermis, being nearly or quite black. In all the specimens the color of the nacre was light purple—none had white or salmon color. It has somewhat the aspect of a very wide *lugubris* (nobis), but it is much wider and not so compressed.

I name this after a friend of Mr. Downie, to whom we are under obligations for his assistance.

UNIO NEISLERII. Pl. 26, fig. 93.

Testâ regulariter plicatâ, quadratâ, inflatâ, ad laterè subplanulatâ, valdè inæquilaterali; valvulis crassis; natibus prominentibus tumidisque; epidermide nigricante, valdè striatâ; dentibus cardinalibus magnis, crassis, crenulatis, in utroque valvulo duplicibus; lateralibus crassis, sublongis curvisque; margaritâ argenteâ et valdè iridescente.

Shell regularly plicate, quadrate, inflated, flattened at the side, very inequilateral; valves thick; beaks prominent and thick; epidermis nearly black and much striated; cardinal teeth large, thick, crenulate and double in both valves; lateral teeth thick, rather long and curved; nacre pure white and very iridescent.

Proc. Acad. Nat. Sci., 1858, p. 165.

Hab.—Flint River at Lanier, Georgia, Dr. H. M. Neisler; at Macon, Georgia, J. C. Plant.

My cabinet and cabinets of Dr. Neisler, Dr. Lewis and Mr. Plant.

Diam. 1.4, Length 2.2, Breadth 2.7 inches.

Shell regularly and numerous plicate, (the folds being nearly parallel,) quadrate, much inflated, flattened at the sides, very inequilateral; substance of the shell thick, thicker behind; beaks prominent and thick; ligament rather long, somewhat thick and dark brown; epidermis nearly black, brownish towards the basal margin; umbonial slope very much raised and rounded; posterior slope raised into a carina, very wide and filled with numerous, slightly curved folds; cardinal teeth very large, thick, crenulate and double in both valves; lateral teeth thick, rather long, minutely granulate and curved; anterior cicatrices distinct, large and very rugose; posterior cicatrices confluent, large and slightly impressed; dorsal cicatrices situated on the under side and near the edge of the plate, which is very large; cavity of the shell very deep and rounded; cavity of the beaks very deep and angular; nacre pure white and very iridescent.

Soft parts.—*Branchial uterus* not charged, but one of the four specimens had the appearance of ova in the ovarium. *Branchiæ* very large, semicircular, inner one much the larger, free two-thirds the length of the abdominal sack. *Palpi* large, rather pendant, suboval, united nearly half way down the posterior edges. *Mantle* thin, whitish. *Branchial opening* very large, with numerous, rather small, brownish papillæ. *Anal opening* very large, with numerous, very small brownish papillæ. *Super-anal opening* very long, colored within and slightly united below. Color of the mass dirty white.

Remarks.—This is among the most remarkable of the plicate group. It is the only species I know where the folds are nearly parallel with the basal line and run nearly parallel with each other; this parallelism is continued over the umbonial slope to the basal margin, so that when this margin is held towards the eye they are seen to be strikingly straight. The folds are stronger towards the basal margin, and being parallel to it, cause an overwrapping of one of the valves at the base in cases where the individual has not quite arrived at maturity. In the mature specimens the basal edges of the valves are equal. The folds being alternate, could not be formed but by alternate overwrapping at the incremental margin. It is greatly to be regretted that we have no specimen with perfect beaks, nor a young one. It is evident that the folds on the beaks must be very small, and lose that regularity which pervades the whole disk, except at the margin of the anterior portion, where all trace of folding is lost. In some of the specimens there is a disposition in the epidermis near the basal margin to be of a lighter brown, while the upper portion is black or blackish. The interior border beyond the nacre is disposed to be reddish brown.

I dedicate this species to Dr. Neisler, to whom I am indebted for many fine Georgian *Unionidæ*.

UNIO POSTELLII. Pl. 26, fig. 94.

Testâ lævi, oblongâ, valdè compressâ, posticè subbiangulatâ, valdè inæquilaterali; valvulis subcrassis; natibus prominulis, ad apices undulatis; epidermide tenebroso-fuscâ, transversè striatâ; dentibus cardinalibus magnis, in utroque valvulo duplicibus, crenulatis; lateralibus prælongis, lamellatis subrectisque; margaritâ vel albâ, vel purpureâ vel salmonis colore tinctâ et iridescente.

Shell smooth, oblong, much compressed, subbiangular behind, very inequilateral; valves somewhat thick; beaks a little prominent, undulate at the tip; epidermis very dark brown and transversely striate; cardinal teeth large, crenulate and double in both valves; lateral teeth very long, lamellar and nearly straight; nacre white, purple or salmon color and iridescent.

Proc. Acad. Nat. Sci., 1858, p. 165.

Hab.—Randall's Creek, near Columbus, Georgia, Bishop Elliott, and Carter's Creek, Baldwin County, Georgia, J. Postell, Esq.

My cabinet and cabinets of Bishop Elliott and Mr. Postell.

Diam. .8,

Length 1.7,

Breadth 3.4 inches.

Shell smooth, oblong, much compressed, subbiangular behind, much flattened on the sides, very inequilateral; substance of the shell somewhat thick, very slightly thicker before; beaks a little prominent, with small, nearly parallel undulations at the tips; ligament long, thick and light brown; epidermis dark brown, striate and with distant marks of growth; umbonial slope very slightly raised into an obtuse angle; posterior slope slightly raised and furnished with two impressed lines on each valve from the beaks to the posterior margin, sometimes causing there an emargination; cardinal teeth large, crenulate, nearly perpendicular and double in both valves; lateral teeth very long, lamellar, granulate and nearly straight; anterior cicatrices distinct, very large and deeply impressed; posterior cicatrices confluent, large and slightly impressed; dorsal cicatrices nearly in the centre of the cavity of the beaks; cavity of the shell very shallow and wide; cavity of the beaks very shallow and rounded; nacre white or salmon color and iridescent.

Soft parts.—*Branchial uterus* occupies the whole width of the outer branchiæ. *Branchiæ* very wide, straight below, inner ones slightly the larger, free two-thirds of the length of the abdominal sack. *Palpi* large, transverse, suboval, united only at the upper portion of the posterior edges. *Mantle* thin, thicker at the margin, where it is slightly colored. *Branchial opening* small, with rather small brownish papillæ. *Anal opening* rather large, with small papillæ on the inner edges. *Super-anal opening* rather large, slightly colored on the inner edges and slightly attached below. Color of the mass whitish.

Embryonic shell is pouch-shape and very closely allied to that of *tortivus* (nobis).

Remarks.—This is a species belonging to the *complanatus* group, but it is usually wider, more compressed, and is generally oblong until it is quite old, when it takes a more oblique subtriangular outline with a subemarginate base. Such is the form of the specimen figured, which will be recognized as including one of the various forms of *complanatus*. The young have a very strong resemblance to *strigosus* (nobis), and on them may be observed very indistinct greenish rays. The undulations on the beaks are very much like those of *complanatus*, but are more oblique. There is also a strong resemblance in this species to *Roswellensis*, described above, but it is more compressed, and not so high on the umbonial slope, nor is it so straight. I dedicate this species to J. Postell, Esq., of St. Simon's Island, Georgia, to whom I am indebted for many fine Georgia *Unionidæ*.

UNIO BURKENSIS. Pl. 27, fig. 95.

Testâ lævi, transversâ, compressâ, ad laterè planulatâ, inequilaterali, posticè biangulatâ; valvulis crassiusculis; natibus prominulis; epidermide fusco-flavicante, micante, obsoletè radiatâ; dentibus cardinalibus breviusculis, compressis, acuminatis; lateralibus longis rectisque; margaritâ purpurecente et iridescente.

Shell smooth, transverse, compressed, flattened at the side, inequilateral and biangular behind; valves somewhat thick; beaks slightly prominent; epidermis yellowish brown, shining and obscurely radiated; cardinal teeth rather short, compressed, pointed; lateral teeth long and straight; nacre purplish and iridescent.

Proc. Acad. Nat. Sci., 1859, p. 112.

Hub.—Buckhead Creek, Burke Co., Geo. Bishop Elliott.

My cabinet and cabinet of Bishop Elliott.

Diam. .6, Length 1.3, Breadth 2.7 inches.

Shell smooth, transverse, compressed, flattened at the side, inequilateral, biangular behind and obliquely rounded before; substance of the shell somewhat thick; beaks slightly prominent; ligament rather long, somewhat thick and lightish brown; epidermis yellowish brown, shining on the sides, obscurely radiated, lines of growth rather close and broad, between which the color on the sides is yellowish; umbonial slope slightly raised and very obtusely angular; posterior slope raised into a moderate carina, dark brown and slightly wrinkled; cardinal teeth rather small, rather short, compressed and pointed; lateral teeth long, straight and lamellar; anterior cicatrices distinct; posterior cicatrices confluent; dorsal cicatrices placed nearly in the centre of the cavity of the beaks; cavity of the shell shallow and wide; cavity of the beaks very shallow, scarcely perceptible; nacre light purple and iridescent.

Remarks.—A single specimen only was received of Bishop Elliott. It is evidently an adult. The beaks being eroded, the character of the tips cannot be given. Probably they are undulate like *complanatus*. The well defined double angle behind is rather remarkable. It causes an emargination above. There is a disposition in the

right cardinal tooth to duplicature; but it is slight and may not exist in all other specimens. This species has some resemblance to *extensus* (nobis) and *naviculoides* (nobis) on one side, and *vicinus* (nobis) on the other, but it is not so transverse as the two former, and is more so than the last. It also agrees in color of epidermis very nearly with *vicinus*, but the lines of growth are not so distant, and they are better defined.

UNIO SATILLAENSIS. Pl. 27, fig. 96.

Testâ lævi, ellipticâ, inflatâ, posticè subbiangulatâ, valdè inæquilaterali; valvulis subcrassis, natibus prominulis; epidermide nigricante, minutè transversè striatâ; dentibus cardinalibus magnis, subcompressis, elevatis, in utroque valvulo duplicibus, crenulatis; lateralibus longis, crassis subcurvisque; margaritâ purpureâ et salmonis colore tinctâ et iridescente.

Shell smooth elliptical, inflated, subbiangular behind, very inequilateral; valves rather thick; beaks prominent; epidermis blackish, minutely and transversely striate; cardinal teeth large, somewhat compressed, raised, crenulate and double in both valves; lateral teeth long, thick and somewhat curved; nacre purple and salmon color and iridescent.

Proc. Acad. Nat. Sci., 1858, p. 166.

Hub.—Satilla River, Camden County, Georgia, T. C. Downie.

My cabinet and cabinet of Mr. Downie, Brunswick, Georgia.

Diam. 1·2,

Length 1·7,

Breadth 3 inches.

Shell smooth, elliptical, inflated, subbiangular behind, very inequilateral; substance of the shell rather thick; beaks prominent; ligament short, thick and dark brown; epidermis blackish, minutely and transversely striate, at the beaks shining; umbonial slope raised into a rather high obtuse angle; posterior slope rather broad, carinate, with a single raised line in each valve from the beaks to the posterior margin, disposed to be wrinkled; cardinal teeth large, somewhat compressed, elevate, crenulate and double in both valves; lateral teeth long, thick, minutely corrugate and somewhat curved; anterior cicatrices distinct, rather small and well impressed; posterior cicatrices confluent and slightly impressed; dorsal cicatrices placed under the plate above the cavity of the beaks; cavity of the shell rather deep and rounded; cavity of the beaks rather shallow and rounded; nacre purple and salmon color and very iridescent.

Soft parts.—*Branchial uterus* ——. No ova were found in the only two specimens received—they were probably males. *Branchiæ* large, thin, much rounded below, inner one much the larger, free two-thirds the length of the abdominal sack. *Palpi* small, thin, suboval, united half way down the posterior edges. *Mantle* thin, dark colored, thickened and whitish at the edges, with numerous papillæ below the branchial opening. *Branchial opening* large, with, numerous brownish papillæ on the inner edges. *Anal opening* small, crenulate along the inner edges. *Super-anal opening* large, colored on the border and united below. Color of the mass whitish.

Remarks.—Three specimens only were received from Mr. Downie, two of which, in alcohol, were males. One of them was quite young, the epidermis of which was yellowish and rayed. This species is nearly allied to *Lecontianus* (nobis), but it is not so thick a shell, and the epidermis is black and striate, while that shell is smooth, bright brown and rayed. It is perhaps more nearly allied to *Downiei* in outline, but it is not so thick as that shell, which differs also in having a brown epidermis and the latter is also more inflated than *Satillaensis*. The three belong to a natural group, the type of which is *Lecontianus*.

UNIO CORVUS. Pl. 27, fig. 97.

Testâ lævi, subtriangulâri, subcompressâ, inæquilaterali, posticè obtusè biangulatâ; valvulis crassis, anticè crassioribus; natibus subprominentibus; epidermide nigricante, supernè glabra, politâ, infernè striatâ; dentibus cardinalibus subgrandibus, subconicis striatisque; lateralibus longis curvisque; margaritâ albâ et iridescente.

Shell smooth, subtriangular, rather compressed, inequilateral, obtusely biangular behind; valves thick, thicker before; beaks somewhat prominent; epidermis blackish, smooth and polished above, striate below; cardinal teeth rather large, subconical and striate; lateral teeth long and curved; nacre white and iridescent.

Proc. Acad. Nat. Sci., 1859, p. 112.

Hab.—Buckhead Creek, Burke County, Georgia, Bishop Elliott, and Ogeechee River, Georgia, Prof. Hanley.

My cabinet and cabinets of Bishop Elliott and Prof. Hanley.

Diam. 1, Length 2·5, Breadth 2·5 inches.

Shell smooth, subtriangular, rather compressed, inequilateral, obtusely biangular behind, regularly rounded before; substance of the shell thick, thicker before; beaks somewhat prominent; ligament short and very thick; epidermis blackish inclining to deep brown, smooth and polished above, transversely striate below, with obscure and rather distant marks of growth; umbonial slope raised into an obtuse angle; cardinal teeth rather large, subconical and striate; lateral teeth long, rather stout and curved; anterior cicatrices distinct and well impressed; posterior cicatrices confluent and well impressed; dorsal cicatrices placed on the under side of the plate posterior to the cardinal teeth; cavity of the shell rather shallow and wide; cavity of the beaks rather shallow and rounded; nacre white and iridescent.

Remarks.—Some time since I received a single specimen of this species from Bishop Elliott, about two and one-half inches wide, and more recently a smaller specimen from Professor Hanley, of Oxford, about two inches wide. These are the only individuals I have seen, and they are both very much eroded and imperfect at the beaks, which of course precludes any notice of the form of the tips. There are some small wrinkles on the posterior slope of each of them. In outline this species is between *incrassatus* (nobis) and *Forbesianus* (nobis). It is not quite so triangular as

the latter, and is more transverse than the former. It is not so stout as *Forbesianus*, nor so great in diameter towards the beaks, and it has a darker epidermis, which is more shining. Neither of the specimens have anything like rays, while in the other two species obscure rays may usually be seen. It bears also some resemblance to *fumatus* (nobis). There is a slight disposition to duplication in the cardinal tooth of the right valve.

UNIO COMPACTUS. Pl. 28, fig. 98.

Testâ lævi, triangulari, subinflatâ, ad laterè planulatâ, posticè angulatâ, inæquilaterali; valvulis crassis; natibus elevatis; epidermide luteo-olivâ, radiis maculatis capillaris creberrimis; dentibus cardinalibus parvis, erectis, in utroque valvulo duplicibus; lateralibus curtis, crassis rectisque; margaritâ albâ et iridescente.

Shell smooth, triangular, somewhat inflated, flattened at the sides and angular behind, inequilateral; valves thick; beaks raised; epidermis yellowish olive, with hair-like, spotted, thickly set rays; cardinal teeth small, erect and double in both valves; lateral teeth short, thick and straight; nacre white and iridescent.

Proc. Acad. Nat. Sci., 1859, p. 154.

Hab.—Etowah River, Georgia, Bishop Elliott and Rev. G. White, and Connasauga River, Bishop Elliott.

Diam. .7,

Length 1,

Breadth 1.3 inches.

Shell smooth, triangular, somewhat inflated, flattened at the sides, angular behind and inequilateral; substance of the shell thick, very little thicker before; beaks raised, thickened and flattened towards the top; ligament very short, thick and brown; epidermis yellowish olive, striate below, and smooth and shining above, nearly covered with hair-like, spotted rays; umbonial slope raised, obtusely angular and in the female much enlarged and crenulate at its basal termination; posterior slope wide, with numerous, very small indented lines from the beaks to the posterior margin; cardinal teeth small, erect, compressed, crenulate and double in both valves; lateral teeth short, thick, straight, abrupt at the end and remarkably arched at the plate joining the cardinal tooth; anterior cicatrices distinct and well impressed; posterior cicatrices distinct and moderately impressed; dorsal cicatrices placed across the base of the cardinal tooth and in the cavity of the beaks; pallear cicatrix generally well impressed, with an *indented line* below the great posterior cicatrix; cavity of the shell rather deep and rounded; cavity of the beaks shallow and obtusely angular; nacre white and iridescent.

Remarks.—Quite a number of this species were sent to me by Bishop Elliott and the Rev. Mr. White. It is a remarkably compact, solid little shell and not easily confounded with other species. In outline it is near to *Foremanianus* (nobis), but it is smaller and not so compressed, and in the character of the rays totally different, the *Foremanianus* having many capillary lines, while the *compactus* has them straight

and minutely maculate, more like *brevidens* (nobis). In some of its characters it is closely allied to *brevidens*. The outline is very different, but the color of the epidermis is nearly the same, and the rays on the posterior portion of both are of the same peculiar character as regards the minutely dotted rays there, while on the side and on the anterior portion the rays are in both species capillary, and very little interrupted. The indentation of the palleal cicatrix is remarkable, and I know of but two other species which have this character in the males, viz., the *brevidens* and *penitus* Con. In the females of several other species, where the feminine character is marked in the shell by a dentated margin, this indentation of the palleal cicatrix is not uncommon, but I know no other species than these three where it occurs in the males. The *compactus* in its outline is not so transverse as *penitus*, but it has the same dotted rays, which, although obscure in *penitus*, exist in all of my specimens, but which are not noticed by Mr. Conrad. It could not be easily confounded with that species. The arch formed at the junction of the cardinal and lateral teeth is not so marked as in *Woodwardianus*, but is still remarkable. Troschel, in Weigmann's Arch., V. 13, p. 266, says that the family *Naiades* is without emargination of the palleal cicatrix, but that is not the case in the two species stated above to have it.

UNIO FIBULOIDES. Pl. 28, fig. 100.

Testâ lævi, subrotundâ, inflatâ, subæquilaterali; valvulis crassis, anticè paulisper crassioribus; natibus crassis et valdè prominentibus; epidermide vel fusâ vel luteo-fuscâ, anticè striatâ; dentibus cardinalibus crassis, compressis crenulatisque; lateralibus curtis, crassis, rectis granulatisque; margaritâ albâ et iridescente.

Shell smooth, nearly round, inflated, nearly equilateral; valves thick, slightly thicker before; beaks thick and very prominent; epidermis brown or yellowish brown; cardinal teeth thick, compressed and crenulate; lateral teeth short, thick, straight and granulate; nacre white and iridescent.

Proc. Acad. Nat. Sci., 1859, p. 154.

Hab.—Connasauga River, Georgia. Bishop Elliott.

My cabinet and cabinet of Bishop Elliott.

Diam. .8,

Length 1.2,

Breadth 1.3 inches.

Shell smooth, nearly round, inflated, gently rounded before, nearly equilateral; substance of the shell thick, slightly thicker before; beaks thick, swollen and very prominent; ligament very short, thick and light brown; epidermis brown or yellowish brown, very minutely striate, with rather close, regular, somewhat impressed lines of growth; umbonial slope raised and rounded; posterior slope depressed, wide, with two indistinct, impressed lines on each valve, from the beaks to posterior margin; cardinal teeth thick, compressed and crenulate; lateral teeth short, thick, granulate, straight and directed towards the point of the beaks, there being between it and the

cardinal tooth a broad arched plate; anterior cicatrices distinct and deeply impressed; posterior cicatrices distinct and deeply impressed; dorsal cicatrices placed under the plate, above the centre of the cavity of the beaks; cavity of the shell moderately deep and rounded; cavity of the beaks shallow and very obtusely angular; nacre white and iridescent.

Remarks.—Several of this interesting little species are before me. It is to be regretted that none were collected with the soft parts for examination. It is closely allied to *nucleopsis* Con. and *Trochelianus* (nobis); but it is more rotund in its outline, and, indeed, more orbicular than either of them. The lines of growth are very regular, nearly equidistant and in the adult number about a dozen. The lateral teeth are very robust, that of the right valve being so much thickened as to approach to duplication. The angle between the cardinal and lateral teeth is unusually small, the older specimens being about 50° , while in the younger ones it is nearly 60° . None had perfect beaks, so that the character of the undulations might be observed, but I have no doubt the tips will be found to have two or three rugose undulations.

UNIO PHASEOLUS Hild.* Pl. 29, fig. 101 and 101 a.

Soft parts.—*Branchial uterus* occupies the whole length of the outer branchiæ, and the upper pointed end of the branchial ovisacks is inserted about one-fourth of an inch from the upper margin in a zig-zag line. These sacks are so numerous, and enlarging as they do, by their clavate form, at the lower end, that they necessarily fall into a succession of folds. In the specimen here described and figured there are thirty-eight folds on each of the outer leaves of the *branchiæ*. These folds will average half an inch, which really gives the length of the line of the lower border nineteen inches, while the shell itself is but three and one-half inches wide. The form of the branchial sack† (pl. 29, fig. 101 a) is that of a very much elongated cone, and its colored margins are altogether very peculiar. From the apex towards the base it is purplish brown, and this gives the whole mass above a dark hue; but where this ceases near the base, there is a dark brown spot on each side surrounded below by a fine brown line, presenting the appearance of a festoon. Below this at the terminal point of each branchial ovisack there is a *bright red spot*, which gives to the whole mass, seen from below, the appearance of rows of minute red currants or beads. The folds are longer in the middle and shorter towards the end of the branchiæ. *Branchiæ*, the inner ones are very large, coming much below the charged branchial leaf of the outer ones, and are united about half the length of the abdominal sack. *Palpi* subtriangular, rather large, thin, united one-third down the posterior edges. *Mantle* very thin, thickened along the margin, which is slightly colored. *Branchial opening* with very small brown

*Am. Journ. Sci., Vol. 14.

†Fig. 1, a, represents three of these sacks placed contiguously to show their form and markings.

papillæ. *Anal opening* seems to have no papillæ, but in living specimens they may perhaps be observed. *Super-anal opening* rather long and colored on the edges. Color of the mass whitish. The muscular attachments to the valves are unusually large and strong. The fine specimen figured was taken in the Scioto River, near Chilicothe, Ohio, by Mr. Henry Moores, to whom I am indebted for it.

UNIO PARVUS Barnes.* Pl. 29, fig 102 and 102 a.

Soft parts.—*Branchial uterus* occupies the posterior half of the outer branchiæ, very like to *heterodon* (nobis), and consists of about a dozen branchial ovisacks on each side, with well marked divisions and extending below the margin of the branchiæ.† *Branchiæ* small, inner one somewhat the larger, rounded below, free more than half the length of the abdominal sack. *Pulpi* rather small, subtriangular, united half way down the posterior edges. *Mantle* rather thick, thickened along the border. *Branchial opening* with numerous light brown papillæ on the inner edges, the edges being black, the opening terminating below on each side with a black spongy looking mass, resembling the lachrymal caruncle of the human eye, except in color.‡ *Anal opening* small, with numerous small papillæ. *Super-anal opening* large, colored on the exterior edges, united below. Color of the mass whitish.

Embryonic shell very light brown, elongate pouch-shape, very nearly a regular ellipse, truncate at dorsal margin. It is allied to *Unio rectus* Lam. in outline, but is not so much truncate.

Remarks.—Fig. 29, pl. 102, represents the form of the branchial uterus and the caruncle like mass on each side of the mantle. In an alcoholic specimen received from Dr. Spillman, of Columbus, Mississippi, in November, I found the uterus charged with embryos sufficiently perfected to be extruded; but in another from Mr. Shaffer, of Cincinnati, in a living state, in May, the parent extruded a number of white branchial ovisacks, which remained attached to the margin of the shell as represented in fig. 2 a. The ova from these sacks, on examination under the microscope, presented a round form, with clear albuminous matter surrounding three vittelary round masses. The form of the branchial ovisack was cylindrical, with the ends pointed and the whole slightly curved, the whole length being nearly two-tenths of an inch long and one-twentieth in diameter. On opening the specimen from Cincinnati in a living condition, I found that the caruncle-like mass had the power of contraction and dilation. In its normal condition this is nearly round and less than the twentieth of an

* Am. Journ. Sci., 1823.

† The females received in September from Mr. Moores of Chilicothe, Ohio, had no ova in the branchial uterus, but the ovaries were filled. Those received from Mr. Shaffer, of Cincinnati, in May, had the branchial uterus filled with embryos.

‡ *U. paulus* (nobis) and *glans* (nobis) also have the same kind of round mass, which, however, in the former species is red, while in the latter it is white. In a single specimen of *paulus* I found this mass to be reddish.

inch in diameter. The form was frequently changed before the wound caused by the knife killed the animal. It assumed that of a hemisphere, then that of a globe, then again that of a stem with a round mass at the end. It evidently had the power of extension into various forms at will, but the object or use of this mass in the three species, in which I have alone observed it to exist, is entirely unknown to me. I think it very likely that, as it is found in these three allied small species, that it will be detected in others which belong to this group. All the specimens I received of *parvus* were females and all had this caruncle like mass. I believe it belongs only to the females, as in the examination of fifteen specimens of *paulus* I found it to exist in ten females and not in one of the remaining five males.

UNIO MULTIPLICATUS. Pl. 30, fig. 105.

Unio multiplicatus Lea, Trans. A. P. S., V. 4, new ser. pl. 4, f. 2, and Obs., V. 1, p. 80.

Unio heros? Say, Disseminator.

Unio undulatus Say, Am. Conch., No. 2, pl. 16.

Unio heros Say, Am. Conch., No. 6.

Soft parts.—*Branchial uterus* occupies the whole of the inner and outer branchiæ on both sides. In the largest specimen of three females before me, the branchiæ were four inches wide, one and a half long and quite a quarter of an inch thick, the whole of these four masses being filled with white embryonic shells, probably to the number of three millions. *Branchiæ* very wide, rounded behind and slightly curved below, inner ones very much the larger, free or attached.* *Pulpi* very large, oblique, thick, subtriangular, united two-thirds down the posterior edges. *Branchial opening* very large, with numerous small brownish papillæ on the inner edges. *Anal opening* large, with scarcely perceptible crenulations on the edges of some, while others seemed to be entirely without. *Super-anal opening* very long, not united below. Color of the mass whitish. The adductor muscles are enormously large and powerful, and the anterior ones make corrugate cicatrices, which are deep and very rough.

Embryonic shell is elongate, pouch-shape, slightly curved on the sides and clear white.†

Remarks.—This is the largest species which inhabits the waters of the United States, and is remarkable for its enormous reproduction. The *branchial uterus* pervades the whole of the four leaves of the branchiæ, and in the largest produces three or four millions of embryonic shells. This character exists only in one other species, so far as I know, viz., *U. rubiginosus* (nobis). (See Proc. Acad. Nat. Sci., June, 1858.) The

*I found in the examination of five specimens of this species, that three had the branchiæ attached the whole length of the abdominal sack and two were free, one of them for a quarter of an inch, the other for three-quarters. This is not the only instance where I have found this difference to exist. It therefore cannot make a division in this family, as proposed by Prof. Agassiz, viz., those which are free and those which are not.

† Jour. Acad. Nat. Sci., V. 4, pl. 5, fig. 3.

largest size of the shell of one taken by me near Cincinnati, is in breadth 8, in length $5\frac{1}{2}$ and in diameter $3\frac{1}{4}$ inches. The two valves, without the soft parts, weighed 2 pounds, $9\frac{1}{2}$ ounces. These dimensions are greater than those of any specimens of which I have any account.

The figure is intended to represent the position of the *branchial uterus* as existing in the four leaves of the branchiæ. The two of the right side are prominent and give a very correct idea of these masses. The right *palpus* lying on the abdominal mass is also correctly displayed. The specimen having been some time in alcohol, did not present the means of giving the *papillæ* of the branchial opening in a natural state, and this part will, therefore, be found to differ from the drawing, somewhat, in living specimens.

UNIO *STRAMINEUS Con.* Pl. 30, fig. 106.

Soft parts.—*Branchial uterus* occupies the posterior end of the outer branchiæ. Ova were found in the ovarium, but none in the uterus, which, however, consisted, in the only specimen before me, of thirteen small sacks on each side, protruding beyond the edge of the branchiæ; these sacks are blackish on the lower ends, which color is caused by a *black secretion within*. *Branchiæ* rather large, slightly curved below, inner ones the larger, united the whole length of abdominal sack. *Pulpi* rather large, subelliptical, united half way down the posterior edges. *Mantle* very thin, very white, with a rather broad, somewhat thickened border. The inferior posterior edges, for a short distance below the branchial opening, have very small whitish papillæ, over which numerous small black spots are dispersed, the base of the papillæ being defined by a black line, at the upper end of which there is a small round black spot, like an eye. Along the basal line the papillæ are continued to the middle, growing smaller as they approach this their terminal point. These papillæ are remarkable, being thickly set, perfectly white and look like rows of fishes' teeth. *Branchial opening* rather large, with numerous whitish, elongate papillæ, enlarged at the base and pointed at the termination. *Anal opening* very small, with numerous, thickly set, whitish papillæ on the inner edges, which are more remote than usual from the outer edges. *Anus* small, crenulate on the edges and pointed. *Super-anal opening* rather small, colored within and united below. Color of the mass unusually white.

Remarks.—I have had but a single specimen to examine, but it is in remarkably fine condition, having a clean and perfect epidermis, with the posterior slope covered by well defined capillary rays, and with rays on the beaks diverging from the tips. It was sent to me by the kindness of Dr. Spillman, of Columbus, Mississippi.

* Am. Jour. Sci., Vol. 25, pl. 1, fig. 6.

UNIO VENTRICOSUS Barnes.* Pl. 30, fig. 107.

Soft parts.—*Branchial uterus* occupies the posterior portion of the outer branchiæ, like *cariosus* Say, and is blackish on the lower border. There were no ova in the uterus, but the enlargement of the branchial ovisacks gave the appearance of their having been recently extruded. *Branchiæ* large, semicircular, inner ones much the larger, united the whole length of the abdominal sack. *Palpi* small, thin, suboval, united nearly half way down the posterior edges. *Mantle* rather thin, very much thickened and enlarged along the lower edges, blackish mottled on the posterior basal edges, which protruded largely, extending a large, fleshy, flexible process, furnished with several acute points. *Branchial opening* large, with numerous, rather large, brownish mottled papillæ. *Anal opening* large, with very numerous, small, brownish mottled papillæ on the edges. *Super-anal opening* very long, colored brown on the inner edges and united at the lower part. Color of the mass whitish.

Remarks.—I am indebted to E. Billings, Esq., of the Canada Geological Survey, for this and many other species in a living state, taken in the St. Lawrence, at Montreal. The drawing made by myself, when the animal had thrown out to its utmost extent those parts which it extrudes when feeding, is well represented by the artist on stone. The shell will be recognised to be a mere hasty, but correct outline of the female form. The fleshy process, as represented, gives a good idea of the extensile and retractile power of these muscular organs. The whole form can be changed at the will of the animal, and all the parts now visible may be drawn within the valves at the slightest alarm.

MARGARITANA MARGARITIFERA.† Pl. 29, fig. 104.

Mya margaritifera Lin.

Margaritana fluviatilis Schum.

Unio elongata Lam.

Alasmodonta falcata Gould.‡

Soft parts.—*Branchial uterus* ——. No ova were found, either in the branchiæ or the abdominal sack, of quite a large number most kindly sent to me alive by Dr. Shurtleff, of Westfield, Mass. It is hardly likely that all could have been males, yet they had that appearance.§ *Branchiæ* very large, curved below, oblique behind and somewhat truncate before, inner ones much the larger, dark lead color passing into black behind and into dirty brown before, free nearly the whole length of the

* Am. Jour. Sci., Vol. 6.

† Synopsis Fam. Naiades, 3d ed. p. 43.

‡ For further synonymy and authors see my "Synopsis."

§ It is much to be regretted that, in giving this description, I am unable to present the form and position of the branchial uterus.

abdominal sack, the posterior extremity not attached to the mantle for half an inch, the point standing out entirely free, but from the point of attachment a filament extends to the margin. *Palpi* large, subfalcate, thin, united more than half way down the posterior edges. *Mantle* thick, much thicker and colored along the edges; on the outside it is whitish or light brown, on the inside, posteriorly, it is quite blackish.* *Branchial opening* very large, black, with very beautiful branching arborescent papillæ. *Anal opening* very large, black and without papillæ. *Super-anal opening* very long, blackish along the inner edges, not united below. The foot is dark colored and partly blackish brown. When the mantle is thrown back, nearly the whole mass within is blackish, the posterior part being quite black. Those parts of the siphons and mantle protruded, when living, as represented in the plate, are entirely black or brownish black. The adductor muscles are very large, as are also the tractors, and these leave deep cicatrices in the nacre, which in the old ones are very much corrugated. The dorsal muscles are attached in the cavity of the beaks, posterior to the cardinal teeth. The pallear cicatrices are well impressed, and the middle part of the mantle being attached to the shell, there are many ventral cicatrices in the cavity. The *Unio monodontus* Say, properly belongs to this genus. The soft parts have the same character, and the hard enveloping parts are very closely allied.

Remarks.—This interesting mussel, which has been so well known to Zoologists, ancient and modern, has never been, as to its soft parts, well described nor well represented. In the plate I have merely represented the fringes, of which I made a drawing at the moment I found them so perfectly extended beyond the margin of the valves. They are very remarkable, and differ from any species of the *Unionidæ* with which I am acquainted. The figure simply represents the form of the fringes, with an accurate outline of the shell and extruded foot. The description of the soft parts is made above with care and exactness. This species is remarkable for its immense geographical distribution. I have it from England, France, Belgium, Germany, Denmark, Norway, and I believe it is found in nearly all parts of Northern Europe. On this side of the Atlantic we have it in the New England States and as far south as middle Pennsylvania. Recently I am in possession of a specimen from Lake St. John, Gaspé, Lower Canada, by the kindness of Sir Wm. E. Logan, Chief of the Geological Survey of Canada. On the western side of the American Continent it is again found, and I owe to the kindness of the officers of the Smithsonian Institution and to Dr. Trask, Geologist of California, the advantage of examining several specimens in alcohol, from California and Oregon, all of which presented the same characters as ours, except that in the color of the nacre those from California and Oregon were purple. Mr. Nuttall, more than twenty years since, gave me specimens which he had brought from Oregon. It is this variety which Dr. Gould has called *Alasmodonta falcata*.

*The prevailing black color is in part owing to a superficial pigment, which is partially removable.

MARGARITANA ELLIOTTH. Pl. 31, fig. 108.

Testâ lævi, ellipticâ, inflatâ, posticè subrotundâ, inequilaterali; valvulis subtenuibus, anticè crassioribus; natibus prominulis, ad apices paulisper undulatis; epidermide micante, radiatâ, vel viridi vel tenebroso-fuscâ; dentibus cardinalibus parvis, compressis, in utroque valvulo unicis; margaritâ cæruleâ et iridescente.

Shell smooth, elliptical, inflated, subrotund behind, inequilateral; valves rather thin, thicker before; beaks a little prominent, slightly undulate at the tips; epidermis shining, radiated, greenish or dark brown; cardinal teeth small, compressed, single in both valves; nacre bluish and iridescent.

Proc. Acad. Nat. Sci., 1858, p. 138.

Hab.—Chattahoochee River, near Columbus, Georgia, Bishop Elliott.

My cabinet and cabinets of Bishop Elliott, Dr. Lewis and G. Hallenbeck.

Diam. .7,

Length 1,

Breadth 1.7 inches.

Shell smooth, elliptical, inflated, rounded behind, inequilateral; substance of the shell rather thin, thicker before; beaks a little prominent, with several subconcentric undulations at the tips; ligament short, thin and light brown; epidermis shining, broadly rayed, greenish or dark brown; umbonial slope raised and rounded; cardinal teeth small, compressed, single in both valves; anterior cicatrices confluent and very slightly impressed; posterior cicatrices confluent and very slightly impressed; dorsal cicatrices placed across the base of the cardinal tooth and within the cavity of the beaks; cavity of the shell deep and wide; cavity of the beaks shallow and subangular; nacre bluish and iridescent.

Soft parts.—*Branchial uterus* —. All the three specimens in alcohol seem to be males. There were no ova to be found. *Branchiæ* large, nearly semicircular, inner ones the larger, free two-thirds of the abdominal sack. *Palpi* large, suboval, united one-third down the posterior edges. *Mantle* thin, thickened at the margin, maculate with brown on the posterior outward edges and crenulate below the branchial opening. *Branchial opening* rather small, with numerous small light brown papillæ. *Anal opening* small, with numerous and very small papillæ on the inner edges. *Super-anal opening* small, united for some distance below, with brown spots on the outer edges. Color of the mass whitish.

Remarks.—It is to be regretted that I could not have the advantage of seeing the female with her charged branchial uterus. There is a resemblance to *Margaritana marginata* in the square spotted marks on the outer edges of the mantle and in the form of the teeth, but it is by no means so stout a shell, nor has it the same kind of rays, nor is it angular on the umbonial slope.

This is a well characterised species. In the outline and in the rays it is very like *A. Ferussaciana* (nobis), but the green rays are more abundant and usually they cover the whole disk, leaving thin rays of yellow between. The old specimens become

quite dark brown and scarcely present any rays. The young are usually bright green and beautifully rayed. Some individuals are more inflated than others. The teeth are sometimes so small that it might be taken for an *Anodonta*, while in others they are larger and more tuberculate, reminding us of the genus *Monocondylaea*, but the teeth do not close in the same manner.

MARGARITANA ETOWAHENSIS. Pl. 31, fig. 110.

Testâ lævi, ellipticâ, subcompressâ, ad lateris planulatis, inæquilaterali; valvulis tenuibus, anticè paulisper crassioribus; natibus prominulis, ad apices rugoso-undulatis; epidermide luteolâ, posticè obsoletè radiatâ; dentibus cardinalibus parvissimis, erectis, tuberculato-compressis, in utroque valvulo unicis; margaritâ cæruleâ et iridescente.

Shell smooth, elliptical, rather compressed, flattened at the sides, inequilateral; valves thin, a little thicker before; beaks a little prominent, rugosely undulate at the tips; epidermis yellowish and obsoletely radiate behind; cardinal teeth very small, erect, compressed, tuberculate and single in both valves; nacre bluish and iridescent.

Proc. Acad. Nat. Sci., 1858, p. 138.

Hab.—Tennessee, Dr. Troost. Etowah River, Georgia, Rev. G. White.

My cabinet and cabinet of Mr. White.

Diam. .6,

Length 1.1,

Breadth 2 inches.

Shell smooth, elliptical, rather compressed, flattened at the sides, rounded before, inequilateral; substance of the shell thin, very little thickened before; beaks somewhat prominent, with several rugose undulations at the tips; ligament rather short, somewhat thick and light brown; epidermis yellowish, obsoletely radiate behind, with distant, well marked, broad marks of growth, which give the exterior a strong banded appearance; umbonal slope slightly raised and rounded; posterior slope carinate; anterior cicatrices confluent and slightly impressed; posterior cicatrices large and confluent; dorsal cicatrices placed under the plate above the centre of the cavity of the beaks; cavity of the shell shallow and wide; cavity of the beaks rather shallow and angular; nacre bluish and iridescent.

Remarks.—A single half grown, poor specimen of this species was received from Dr. Troost many years since. It being analogous to *Holstonia* (nobis), I had doubts of its being more than a marked variation. The adult specimen, however, which is figured—received from the Rev. Mr. White—satisfies me that they are distinct species. The figure is made from Mr. White's specimen. The younger specimens of *Holstonia* have a much closer resemblance than the adults, but the marked difference of the cardinal tooth of the left valve designates the two species. In the *Holstonia* it is *trifid*, in the *Etowahensis* it is single. The outline also is different, the *Holstonia* being more transverse, and the shell is thicker. In the undulations of the beaks there is also a difference as far as I am able to judge, of the imperfect beaks of the two specimens of *Etowahensis* before me. In the *Holstonia* these are smaller and

large, without any papillæ on the edges. *Super-anal opening* rather small and united for some distance below. *Anus* somewhat corrugate. Color of the mass whitish.

Embryonic shell is subtriangular and nearly allied to *marginata*. Journ. Acad. Nat. Sci., New Ser., Vol. 4, pl. 5, fig. 28.

Remarks.—I have received a number of specimens from different southern habitats all bearing the same characters. The species is closely allied to *M. undulata* (*Alasmodonta* Say) so common to our eastern rivers. It differs from it in being more triangular, less oblique, less ponderous, and in having the teeth single and not double in the left valve as in *undulata*. The undulations of the beaks, although of the same character, are smaller, and the posterior slope is flatter and wider. The angle on the umbonial slope is also much more strongly marked.

MARGARITANA CONNASAUGAENSIS. Pl. 32, fig. 113.

Testâ lævi, obovatâ, posticè inflatâ, anticè et posticè rotundatâ, valdè inæquilaterali; valvulis pertenuibus; natibus prominulis, ad apices rugoso-undulatis; epidermide viridi-luteâ, posticè obsoletè radiatâ; dentibus cardinalibus parvis, compresso-tuberculatis, in utroque valvulo unicis; margaritâ cæruleo-albâ et iridescente.

Shell smooth, obovate, inflated behind, rounded before and behind, very inequilateral; valves very thin; beaks a little prominent and rugosely undulate at the tips; epidermis greenish yellow, obsoletely radiate behind; cardinal teeth small, compressed, tuberculate and single in both valves; nacre bluish white and iridescent.

Proc. Acad. Nat. Sci., 1858, p. 138.

Hab.—Connasauga River, one of the head waters of the Alabama River, in Gilmer County, Georgia, Bishop Elliott. Tennessee, J. G. Anthony.

My cabinet and cabinets of Bishop Elliott and Mr. Anthony.

Diam. 1, Length 1.4, Breadth 2.4 inches.

Shell smooth, obovate, inflated behind, rounded before and behind, subemarginate at base, very inequilateral; substance of the shell very thin; beaks a little prominent, with three or four large, transverse undulations on each of the tips; ligament rather long and moderately thick; epidermis greenish yellow, obscurely radiate behind, striate before and with very distant, well defined marks of growth; umbonial slope much inflated and rounded; posterior slope raised into a carina and furnished with two obscure impressed lines in each valve, from the beaks to the posterior margin; cardinal teeth small, compressed, tuberculate and single in both valves; anterior cicatrices large, confluent and very slightly impressed; posterior cicatrices confluent, large and scarcely discernible; dorsal cicatrices placed under the plate, above the cavity of the beaks; cavity of the shell deep and rounded; cavity of the beaks shallow and subangular; nacre bluish white and very iridescent.

Remarks.—There is only a single specimen of this species before me, and, unfortunately, I have not had the opportunity of examining the soft parts. It is not closely

* It may be remembered that the substance of the valve of the *Unionidae*, is made up of three parts, viz., the nacre, the cell structure and the periostracum.

embryos in the outer branchiæ. This had them perfected and only filling the anterior third, so that these branchial uteri presented the appearance of having discharged more than half the young, the part not charged presenting a colored mass. *Branchiæ* large, nearly semicircular, inner ones the larger on the anterior ends, free nearly half the length of abdominal sack. *Palpi* rather large, suboval, united but a short distance on the posterior edges. *Mantle* thin and delicate, thickened at the border. *Branchial opening* large, blackish within and without, with numerous, reddish papillæ on the inner edges. *Anal opening* black within, edges reddish, without papillæ. *Super-anal opening* rather small, edges slightly colored, united for some distance below. Color of the mass whitish.

Embryonic shell light brown, subtriangular, and very near to *An. undulata* (nobis) in outline.

Remarks.—I have the advantage of examining ten specimens of different ages. It is nearly allied to *fluviatilis*, but is more inflated over the umbonial slope and not quite so transverse, nor has it so smooth an epidermis. On the other side it leans towards *gibbosa* Say, but is not so much inflated over the umbonial slope. It will also call to mind *Stewartiana* (nobis), but it is more transverse and has a smoother epidermis. In several of the young specimens in my possession the ligament is concealed.

ANODONTA GESNERII. Pl. 31, fig. 109.

Testâ lævi, ellipticâ, valdè inflatâ, posticè subangulatâ, anticè sulcatâ, valdè inæquilaterali; valvulis subcrassis; natibus prominentibus, tumidis; epidermide valdè politâ, vel viridi vel luteâ, obsoletè radiatâ; margaritâ vel albâ vel aureâ et iridescente.

Shell smooth, elliptical, very much inflated, subangular behind, sulcate before, very inequilateral; valves rather thick; beaks rather prominent, swollen; epidermis very much polished, greenish or yellowish, obsoletely rayed; nacre either white or golden and iridescent.

Proc. Acad. Nat. Sci., 1858, p. 139.

Hab.—Uphaupee Creek, Macon County, Alabama. Wm. Gesner, of Milledgeville, Georgia.

My cabinet and cabinets of Mr. Gesner, Dr. Lewis and Mr. Hallenbeck.

Diam. 1·8, Length 2·5, Breadth 4·7 inches.

Shell smooth, elliptical, very much inflated, subangular behind, sulcate before, very inequilateral; substance of the shell rather thick; beaks rather prominent and swollen; ligament rather long, moderately thick and light brown; epidermis very smooth and much polished, greenish or yellowish, obsoletely rayed, with very distant lines of growth; umbonial slope raised and rounded; posterior slope large, with two dark rays passing from the beaks to the posterior margin; anterior cicatrices large, confluent

and slightly impressed; posterior cicatrices confluent and very slightly impressed; cavity of the shell very deep and very wide; cavity of the beaks somewhat deep and rounded; nacre white or golden and iridescent.

Remarks.—This is a very fine species, which is found as wide as seven and a half inches. It reminds one of *A. cygnea* Lam., but is more ponderous and more inflated. It is rather more transverse than *fluvialis*, which sometimes is nearly as large. Young specimens remind one of *Dunlapiana* (nobis), from South Carolina. The nacre is remarkably rich, and in some specimens it has a soft, satin, golden hue. The old individuals are disposed to be much thickened along the margin. Some specimens are very much sulcate on the anterior portion and have yellow and green bands. The posterior slope is usually dark. It is to be regretted that we have not the opportunity of examining the soft parts of this species. None were received in alcohol. I dedicate this fine species with pleasure to Mr. William Gesner, to whom I am indebted for many fine *Unionidæ* of Georgia.

ANODONTA HALLENBECKII. Pl. 32, fig. 112.

Testâ sulcatâ, ad basin subarcuatâ, valdè inflatâ, posticè et anticè rotundatâ, inequilaterali; valvulis subtenuibus, anticè paulisper crassioribus; natibus prominentibus, tumidis; epidermide micante, vel luteâ vel tenebroso-olivâ, eradiatâ; margaritâ albâ et iridescente.

Shell sulcate, subarcuate at the base, very much inflated, rounded behind and before; inequilateral; valves rather thin, slightly thicker before; beaks rather prominent, swollen; epidermis shining, yellow and dark olive, without rays; nacre white and iridescent.

Proc. Acad. Nat. Sci., 1858, p. 138.

Hab.—Upahupsee Creek, Macon County, Georgia. W. Gesner.

My cabinet and cabinet of Mr. Gesner, Mr. Hallenbeck and Dr. Lewis.

Diam. 1·5,

Length 2·2,

Breadth 4 inches.

Shell sulcate, subarcuate at base, very much inflated, rounded behind and before, inequilateral; substance of the shell rather thin, slightly thicker before; beaks rather prominent, swollen; ligament rather long, thick and dark brown; epidermis shining, yellow or dark olive, without rays, with distant marks of growth; umbonial slope raised and rounded; posterior slope slightly raised, dark and striate; anterior cicatrices large, confluent and slightly impressed; posterior cicatrices confluent, large and very slightly impressed; dorsal cicatrices placed in the centre of the cavity of the beaks; palleal cicatrix broad, but very indistinct; cavity of the shell deep and broad; cavity of the beaks shallow and obtusely angular; nacre white and iridescent.

Remarks.—This species is nearest allied to *Gesnerii* (nobis), but may be distinguished at once by the sulcations of the surface and the emargination of the basal line. The youngest of four specimens before me is not emarginate, but would no doubt

have become so at maturity; an old one is more emarginate than the one figured. The old specimens are very dark on the umbones and light yellow at the inferior margin. None had the beaks sufficiently perfect to give the character of the undulations of the tips. On the posterior slope it is dark and roughly striate. It is with much pleasure I dedicate this species to Garret Hallenbeck, Esq., to whom I am indebted for so many fine Georgian Mollusca.

ART. VII.—*Descriptions of Exotic Unionidae.*

BY ISAAC LEA, LL. D.

In my last two papers, published in the Journal of the Academy, there were described at length and figured eighty-two indigenous species of this family, many with the soft parts and embryonic forms. In the paper previous to the two above mentioned, I described thirty-three exotic species. In the present paper, which I offer to the Academy, I return to the exotic forms, which have, through the kindness of many obliging friends, increased upon my hands during the last two or three years. It will be observed that I have added some full descriptions of a few species from the Philippine Islands, long since temporarily described in the Proceedings of the Zoological Society of London. These are now for the first time described at length and illustrated, careful drawings having been made from good specimens since kindly sent to me by H. Cuming, Esq., who collected them during his dangerous voyage among those islands investigating their natural history.

This paper will probably be followed by another, about the same size, perhaps larger, now nearly ready, on the indigenous species again, which have accumulated on my hands for some time. The interest taken in the development of the family *Unionidae* by numerous kind friends in Georgia, Alabama, Mississippi and North Carolina, who study this branch of natural history, has been most untiring, and I renew here the expression of my great obligations to them, in which, I feel assured, all malacologists will join me. It will be observed that I have done nothing more than justice in mentioning, in the description of each of the species, the source from whence they were obtained, the names being appended to each.

MONOCONDYLÆA CUMINGII. Pl. 33, fig. 114.

Testâ lævi, obovatâ, compressâ, inæquilaterali, posticè subbiangulatâ; valvulis suberassis; natibus vix prominentibus; epidermide atro-fuscâ; dentibus cardinalibus lobatis, in utroque valvulo unicis; margaritâ albâ et iridescente.

Shell smooth, obovate, compressed, inequilateral, subbiangular behind; valves somewhat thick; beaks scarcely prominent; epidermis blackish brown; cardinal teeth lobed and single in both valves; nacre white and iridescent.

Anodonta Cumingii, Lea. Proc. Zool. Soc., Lond., 1850, p. 199.

Hab.—Malacca. H. Cuming.

My cabinet and cabinet of Mr. Cuming.

Diam. 1,

Length 1·9,

Breadth 3 inches.

Shell smooth, obovate, compressed, inequilateral, subbiangular behind; substance of the shell somewhat thick; beaks scarcely prominent; ligament long, rather thick and dark brown; epidermis blackish brown, darker and minutely striate on the anterior portion, lighter and shining in the middle, marks of growth rather distant; umbonial slope raised and rounded; posterior slope raised into a high carina, with two raised lines passing from the beaks to the posterior margin and also with some obscure small folds towards the beaks; cardinal teeth small, with a single lobe in each valve, the right one being the larger and locking in anteriorly to that in the left valve; anterior cicatrices confluent and well impressed; posterior cicatrices confluent, rather large and slightly impressed; dorsal cicatrices well impressed and placed in a row across the centre of the cavity of the beaks; cavity of the shell rather shallow and rounded; cavity of the beaks, very shallow and rounded; nacre white and iridescent.

Remarks.—This is a very interesting species which I formerly described as an *Anodonta*, but which, by examining other specimens, I am satisfied is a true *Monocondylæa* of D'Orbigny, although the lobed teeth are not quite so large and perfect as in his South American species. It is nearly allied to *Mono. Vondenbuschiana* (nobis) and *Alas. Bonellii* Fer., (which I place with the *Monocondylææ*) in the form of the teeth, but not in the outline as regards the latter. It may be distinguished from the former by its more transverse form, its carina being lower, and in having a darker epidermis. In the four specimens before me the beaks are too much eroded to describe the undulations of the tips, but on one there is evidence, on the posterior slope, that the upper portion of the beaks may be covered with minute regular undulations entirely to the tips.

ANODONTA SUBCRASSA. Pl. 33, fig. 115.

Testâ lævi, oblongâ, subinflâtâ, subæquilaterali; valvulis subcrassis, anticè crassioribus; natibus prominentibus undulatisque; epidermide luteo-fuscâ, eradiatâ; margaritâ albidâ vel purpureâ vel salmonis colore tinctâ et iridescente.

Shell smooth, oblong, somewhat inflated, nearly equilateral; valves rather thick, thicker before; beaks rather prominent and undulate at the tips; epidermis yellowish brown, without rays; nacre whitish or purple and salmon color and iridescent.

Anodonta subcrassa, Lea. Proc. Zool. Soc., Lond., 1850, p. 198.

Hab.—Laguna de Bai, Luzon, Philippines. H. Cuming.

My cabinet and cabinet of Mr. Cuming.

Diam. 1·2,

Length 1·7,

Breadth 2·9 inches.

Shell smooth, oblong, somewhat inflated, nearly equilateral, rounded behind and obliquely rounded before; substance of the shell rather thick, thicker before; beaks rather prominent and undulate at the tips; ligament rather long, somewhat thick and light brown; epidermis yellowish brown, striate, sulcate on the anterior portion, without rays, darker on the posterior slope; umbonial slope very much rounded; dorsal line has a slight callus under the beak; anterior cicatrices distinct and well impressed; posterior cicatrices confluent and very large; dorsal cicatrices deep and placed in a row across the cavity of the beaks; cavity of the shell rather deep and wide; cavity of the beaks very shallow and rounded; nacre whitish or purple and salmon color and iridescent.

Remarks.—It is rare to meet with an *Anodonta* of the thickness of this species, but still it is not so ponderous as the *arcuata*, Fer., or as *lato-marginata*, (nobis). It cannot be confounded with either of these species, not being arcuate, and not having compressed beaks like the former, and being oblong and thinner than the latter, as well as also being destitute of the broad margin. The substance of the shell is slightly thickened anteriorly, and the basal margin is emarginate; the beaks are submedial, and, when perfect, are beautifully ornate, with numerous small folds, which form an acute angle from the point of the beaks, nearly parallel to the line of the umbonial slope. The color of a single young specimen before me is salmon inclining to purple, and the adults have the cavity of the beaks tinted in this manner. In the young specimen the lamellar line on the dorsal margin is very well defined, in the adults this character is nearly obliterated.

ANODONTA TENUIS. Pl. 33, fig. 116.

Testâ lævi, obovatâ, ad laterè valdè compressâ, inæquilaterali; valvulis pertenuibus; natibus subprominentibus, ad apices undulatis; epidermide tenebroso-fuscâ, obsoletè radiatâ, striatâ; margaritâ purpureâ et valdè iridescente.

Shell smooth, obovate, very much compressed at the side, inequilateral; valves very thin; beaks a little prominent, undulate at the tips; epidermis dark brown, obsoletely radiate and striate; nacre purple and very iridescent.

Anodonta tenuis, Lea. Proc. Zool. Soc., Lond., 1850, p. 198.

Hab.—Sual, Luzon, Philippines. H. Cuming.

Diam. 1, Length 1·7, Breadth 3 inches.

Shell smooth, obovate, very much compressed at the side; inequilateral, widely rounded behind; substance of the shell very thin, slightly thickened before; beaks a little prominent, minutely undulate at the tips; ligament rather large, thin and light brown; epidermis dark brown, obsoletely radiate, striate, and with rather distant lines of growth; umbonial slope raised and much rounded; posterior slope dark brown, raised into a carina; anterior cicatrices distinct and but slightly impressed;

posterior cicatrices confluent, very large and very slightly impressed; dorsal cicatrices small, placed in the centre of the cavity of the beaks; cavity of the shell rather deep and wide; cavity of the beaks very shallow and rounded; nacre either purple or white and iridescent.

Remarks.—This is very closely allied to *An. crepera* herein described, and may, perhaps, when more specimens of the old and young of both species are compared, prove only to be a variety. The specimens before me, however, differ in the *tenuis* being rather thinner and less elliptical, the outline inclining to obovate. The existence of teeth in the young, and the rudiments on the dorsal line in the adult, are very similar to the *crepera*. Of the four specimens before me, two have the nacre purple and two white. The beaks are too much eroded to observe any marks of undulations, except in one case.

ANODONTA CREPERA. Pl. 34, fig. 117.

Testâ lævi, ellipticâ, subinflatâ, valdè inæquilaterali; valvulis tenuibus, anticè crassioribus; natibus sub-prominentibus; epidermide fusco-virente, obsoletè radiatâ; margaritâ vel albâ vel purpureâ et valdè iridescente.

Shell smooth, elliptical, somewhat inflated, very inequilateral; valves thin, thicker before; beaks somewhat prominent; epidermis greenish brown, obsoletely radiated; nacre white or purple and very iridescent.

Anodonta crepera, Lea. Proc. Zool. Soc., Lond., 1850, p. 198.

Hab.—Bongabon, Luzon, Philippines. H. Cuming.

My cabinet and cabinet of Mr. Cuming.

Diam. 1.1,

Length 1.8,

Breadth 3.3 inches.

Shell smooth, elliptical, somewhat inflated, very inequilateral, rounded behind; substance of the shell thin, thicker before and diaphanous behind; beaks somewhat prominent; ligament rather short, rather thin and light brown; epidermis greenish brown, obscurely rayed, striate, shining towards the beaks, with distant lines of growth; umbonial slope slightly raised and very slightly rounded; posterior slope raised into a carina, striate and dark brown; anterior cicatrices distinct, slightly impressed; posterior cicatrices confluent, large and very slightly impressed; dorsal cicatrices placed in the centre of the cavity of the beaks; cavity of the shell rather deep and wide; cavity of the beaks very shallow and very much rounded; nacre white or purple and very iridescent.

Remarks.—Five of the six specimens under examination are purple, the sixth whitish. The outline is nearly oval. One of the specimens is obtusely biangular posteriorly; the substance of the shell is slightly thickened anteriorly; the beaks are too much eroded to observe any undulations. This species is closely allied to *A. tenuis*, but is not quite so thin, and is more transverse. Three specimens of the

young have a well-defined anterior lamellar tooth and a distinct posterior raised line, which, in the left valve, is slightly divided. This is so marked in these young specimens, that one would hardly hesitate to place them among the *Uniones* if we had not the adults, which have scarcely a vestige of the elevated lines on the dorsal margin.

UNIO SUMATRENSIS. Pl. 34, fig. 118.

Testâ plicatâ, subtriangulari, subventricosâ, posticè subbiangulatâ, inæquilaterali; valvulis subcrassis; natibus subprominentibus; epidermide micante, luteo-olivâ, posticè virenti; dentibus cardinalibus lamellatis, compressis, obliquis, in utroque valvulo duplicibus; lateralibus subbrevis curvisque; margaritâ albâ et iridescente.

Shell plicate, subtriangular, rather inflated, subbiangular behind, inequilateral; valves rather thick; beaks somewhat prominent; epidermis shining, yellowish olive, greenish behind; cardinal teeth lamellar, compressed, oblique and double in both valves; lateral teeth rather short and curved; nacre white and iridescent.

Unio Sumatrensis, Lea. Proc. Acad. Nat. Sci., 1859, p. 153.

Hab.—Sumatra. H. Cuming.

My cabinet and cabinets of Mr. Cuming and C. M. Wheatley.

Diam. .9, Length 1.1, Breadth 1.8 inches.

Shell with very small folds nearly over the whole disk, subtriangular, rather inflated, subbiangular behind, inequilateral; substance of the shell rather thick; beaks somewhat prominent; ligament short, thin and bright brown; epidermis shining, yellowish olive, subsulcate, without rays; umbonial slope raised and rounded; posterior slope wide, with very small oblique, nearly parallel folds; cardinal teeth lamellar, compressed, very oblique, nearly straight and double in both valves; lateral teeth rather short and curved; anterior cicatrices confluent; posterior cicatrices confluent; dorsal cicatrices placed on the under side of the posterior portion of the cardinal teeth; cavity of the shell deep and rounded; cavity of the beaks rather deep and obtusely angular; nacre white and iridescent.

Remarks.—In outline and color this species is allied to *U. Javanus* (nobis), but it is more triangular, more inflated and has small irregular folds over the whole disk. It is greatly to be regretted to be obliged to make diagnoses from single specimens as is necessary in many of these rare foreign species. When many and more perfect specimens are obtained very essentially different characters may be observed.

ANODONTA GRACILIS. Pl. 34, fig. 119.

Testâ lævi, transversâ, subcylindraceâ, valdè inæquilaterali; valvulis tenuibus; natibus subprominentibus, ad apices undulatis; epidermide flavescente, striatâ; margaritâ vel albâ vel perpurgâ et valdè iridescente.

Shell smooth, transverse, subcylindrical, very inequilateral; valves thin; beaks a

little prominent, undulate at the tips; epidermis yellowish and striate; nacre either purple or white and very iridescent.

Anodonta gracilis, Lea. Proc. Zool. Soc. Lond., 1850, p. 197.

Hab.—Dingle, Isle of Panay. H. Cuming.

My cabinet and cabinet of Mr. Cuming.

Diam. 1, Length 1·7, Breadth 3·4 inches.

Shell smooth, transverse, subcylindrical, very inequilateral, rounded behind, with a broad internal margin; substance of the shell thin, slightly thicker before; beaks a little prominent, undulate at the tips; ligament long, somewhat thick and dark brown; epidermis yellowish, sometimes inclining to brown, sometimes to green, obscurely radiate, with distant lines of growth, striate; umbonial slope slightly raised and rounded; posterior slope raised into a keel, thickly striate and darker in color; anterior cicatrices distinct and slightly impressed; posterior cicatrices confluent and faintly impressed; dorsal cicatrices placed on the upper and inner side of the cavity of the beaks directly under the point of the beak; cavity of the shell rather deep and wide; cavity of the beaks shallow and rounded; nacre either purple or white and very iridescent.

Remarks.—This species is more cylindrical than is usual with the *Anodontæ*, and differs from the other species taken by Mr. Cuming in this character; it is rounded anteriorly, and is subangular posteriorly. The dorsal margin is nearly straight, the basal margin is slightly emarginate, the disk being disposed to be flattish. In the specimens under examination, the beaks are all more or less eroded, but in the youngest there are slight indications of undulations.

The four species herein described from the Philippines are remarkable in the character of the dorsal line, which rises immediately under the margin into a dentoid line somewhat lamellar, and approaching in its character the more distinct tooth of the genus *Dipsas*, Leach. In the younger specimens this is much more distinctly marked, and in the older it becomes obsolete. This group of *Anodontæ*, having this dentoid character, would seem to form a natural connection on one side with the genus *Dipsas* and on the other with the genus *Unio*, connecting with *U. Bengalensis* brought by Dr. Burrough from India, and described by me in the Trans. Am. Phil. Soc. vol. vi. pl. 2, fig. 3. This remarkable form of tooth, if it may be so called, is peculiar to that part of the world, so far as my observation extends; for among the numerous species examined by me from Europe, Africa and America, South as well as North, I have never met with this character developed as in those alluded to above.

UNIO CUMINGII. Pl. 35, fig. 120.

Testâ bialatâ, plicatâ, triangulari, valdè compressâ, posticè angulatâ, valdè inæquilaterali; alâ posteriori elevatâ, acuminatâ, margine crenulatâ: valvulis subtenuibus antè et post nates connatis; natibus et

alæ posterioris basi apiceque undulatis, natibus compressis, ad apicem undulatis, haud prominentibus; epidermide nitidâ, tenebroso-viridi et totâ radiatâ; dentibus cardinalibus parviusculis, compressis, in utroque valvulo duplicibus et cernuis; lateralibus longissimis, lamellatis subcurvisque; ligamento celato; margaritâ albâ et valdè iridescente.

Shell double winged, plicate, triangular, very much compressed, angular behind, very inequilateral; posterior wing high, acuminate, crenulate on the margin; valves rather thin, connate before and behind the beak; beaks compressed, not prominent, undulate to the tip; the base and summit of the posterior wing undulated; epidermis shining, dark green radiated all over; cardinal teeth rather small, compressed, double in both valves and inclined downwards; lateral teeth very long, lamellar and somewhat curved; ligament concealed; nacre white and beautifully iridescent.

Unio Cumingii, Lea. Proc. Acad. Nat. Sci., Vol. 6, p. 54.

Hab.—Northern part of China. H. Cuming.

My cabinet and cabinet of Mr. Cuming, London.

Diam. 1,

Length 4.5,

Breadth 5.2 inches.

Shell double winged, folded on the side and behind the umbonial slope, triangular, very much compressed, angular behind, very inequilateral; posterior wing high, acuminate, crenulate on the superior margin; anterior wing very small and slightly elevated; substance of the shell rather thin, connate before and behind the beaks; beaks, as well as the base and summit of the posterior wing, undulated; compressed, undulated at tip, not prominent; ligament concealed; epidermis smooth and shining, dark green, radiated all over, even to the extremity of the wing, with distant marks of growth; umbonial slope slightly elevated and rounded; posterior slope raised into a high wing; cardinal teeth rather small, compressed, double in both valves and inclining downwards; lateral teeth very long, lamellar and somewhat curved, single in the right and double in the left valve; anterior cicatrices small, the superior and lateral smaller ones both distinct from the large one; posterior cicatrices confluent and indistinct; dorsal cicatrices small, placed obliquely across the cavity of the beak; palleal cicatrix well impressed and very distant from the margin of the disk; cavity of the shell extremely shallow; cavity of the beaks scarcely perceptible; nacre white and richly iridescent.

Remarks.—This very beautiful and rare *Unio* is, in form and general outline, very much like the *Dipsas plicatus*, Leach, but they cannot be confounded with each other, as they belong to very distinct genera, the *Dipsas* having but one linear tooth in each valve, while the above described shell has perfectly well defined, compressed, cardinal teeth, double in both valves. It also has long lateral, lamellar teeth, double in the left and single in the right valve. It differs also in the folds, having them extending over the flattened side from the beaks, becoming lower and more obscure

towards the basal margin. The folds on the wing also differ, the *Cumingii* having the row from the beak to the posterior margin irregular and indistinct, and much nearer to the umbonial slope, which is slightly carinate. The folds in the superior part of the wing are small and scarcely more than irregular curves along the edge. This shell is very much compressed at the beaks, and reminds one of the *Margaritana complanata*. The long lateral teeth are very remarkable, they are perfectly lamellar, like the blade of a knife, and rise straight and abruptly from the plain of the disk. The cardinal teeth are inclined downwards and are irregular. The folds on the side and on the posterior slope are very distinctly marked within; those of the sides enlarging into distant low undulations to the basal margin. The cicatrix, which is superior to the great anterior cicatrix, is not placed, as is usual in this genus, at the immediate end of the cardinal tooth, but on the plain of the disk, a short distance behind that tooth, and perfectly distinct from it and the other two cicatrices. The position of the pallear cicatrix is very remarkable. In the anterior part it is three-fourths of an inch from the margin, and in the posterior portion one and three-fourths of an inch distant. It is the most beautifully rayed shell I am acquainted with, being furnished all over the whole disks with closely set, dark green rays, on a yellowish ground. Mr. Cuming, to whom I owe the possession of two fine specimens, received them from the northern part of China, and I dedicate it to him who has done so much to develop the knowledge of the Molluscs from a large portion of the globe.

UNIO SHANGHAIENSIS. Pl. 36, fig. 121.

Testâ lxxvi, valdè transversâ, valdè inaequilaterali, inflatâ, cylindraceâ, posticè subbiangulatâ; valvulis crassiusculis, anticè crassioribus; natibus subprominentibus, ad apices corrugatis et plicatis; epidermide tenebroso-olivâ, nitidâ, obsoletè radiatâ; dentibus cardinalibus parviusculis, compressis, crenulatis, rectis, in utroque valvulo duplicibus; lateralibus praelongis, lamellatis rectisque; margaritâ argenteâ et valdè iridescente.

Shell smooth, very transverse, very inequilateral, inflated, cylindrical, somewhat biangular behind; valves somewhat thick, thicker before; beaks rather prominent, corrugated and folded at the apex; epidermis very dark olive, shining, obscurely radiate; cardinal teeth rather small, compressed, crenulate, straight, double in both valves; lateral teeth very long, lamellar and straight; nacre silver white and very iridescent.

Unio Shanghaiensis, Lea. Proc. Acad. Nat. Sci., 1859, p. 153.

Hab.—Shanghai, China. H. Cuming.

My cabinet and cabinets of Mr. Cuming and Mr. Wheatley.

Diam. .7,

Length 1,

Breadth 2.2 inches.

Shell smooth, very wide, very inequilateral, inflated, cylindrical, somewhat biangular behind and regularly rounded before, flattened on the sides and subemarginate at base; substance of the shell somewhat thick, thicker before; beaks rather promi-

nent, corrugated and folded at the apex; ligament long, narrow and light brown; epidermis very dark olive, shining, obscurely rayed on the side, but furnished on each side of the posterior slope, with three well marked rays from the beak to the posterior margin; umbonial slope raised into an obtuse angle; cardinal teeth rather small, compressed, crenulate, straight and double in both valves; lateral teeth very long, lamellar and straight; anterior cicatrices distinct and well impressed; posterior cicatrices confluent; pallial cicatrix well impressed; dorsal cicatrices situated on the under side of the plate within the cavity of the beaks; cavity of the shell deep and wide; cavity of the beaks deep and subangular; nacre silver white and very iridescent.

Remarks.—A single specimen only has been submitted to me by Mr. Cuming. It is nearest in outline and general appearance to *U. sagittarius* (nobis) from Siam, but is a larger species, more regularly cylindrical, darker epidermis and with thicker teeth. It is somewhat like *U. Murchisonianus* (nobis), but has no folds, is wider and not so much compressed. It has also some resemblance to *U. Dunkerianus* (nobis) in color, polish and outline, but it has no folds, is not so much compressed and has not an elevated carina. The teeth are very well defined in *Shanghaiensis*, and in the right valve the lateral tooth is disposed to be double in this specimen, which may not, however, be universally the case. It is very unusual in any *Unio* to have double lateral teeth in both valves.

UNIO LAYARDII. Pl. 36, fig. 122.

Testâ lævi, ellipticâ, inflatâ, posticè obtusè angulatâ, anticè regulariter rotundatâ, subæquilaterali; valvulis crassiusculis; natibus prominulis; epidermide valdè politâ, micante, tenebroso-fuscâ, nigricante, eradiatâ; dentibus cardinalibus longis, lamellatis, obliquis, in valvulam dextram duplicibus; lateralibus longis subcurvisque; margaritâ albâ et iridescente.

Shell smooth, elliptical, inflated, obtusely angular behind, regularly rounded before, nearly equilateral; valves a little thickened; beaks a little prominent; epidermis much polished, bright, very dark brown, passing into black, without rays; cardinal teeth long, lamellar, oblique, double in the right valve; lateral teeth long and somewhat curved; nacre white and iridescent.

Unio Layardii, Lea. Proc. Acad. Nat. Sci., 1859, p. 153.

Hab.—Ceylon. Frederick Layard.

Cabinet of Mr. Cuming, London, and C. M. Wheatley, Phoenixville, Pa.

Diam. 1.2, Length 1.8, Breadth 2.8 inches.

Shell smooth, elliptical, inflated, obtusely angular behind, regularly rounded before, nearly equilateral and slightly curved on the dorsal line; substance of the shell moderately thick; beaks a little prominent, submedial; ligament slender, cinnamon color; epidermis very smooth, polished, bright, without rays, very dark brown,

passing into black, except at the beaks and the basal margin, which are lightish brown; umbonial slope rounded; cardinal teeth long, lamellar, oblique, *double* in the *right* valve and *single* in the *left*; lateral teeth long and somewhat curved, double in the left and single in the right valve; anterior cicatrices distinct, rather small; posterior cicatrices confluent; dorsal cicatrices small and placed in the cavity of the beaks, under the cardinal teeth; cavity of the shell wide and rather deep; cavity of the beaks small and subangular; nacre pure white and iridescent.

Remarks.—A single specimen only was submitted to me by Mr. Cuming. In outline it is very much the same as *Unio spinosus* (nobis) and is about the same size. The teeth are very different, however, and the absence of anything like spines would at once prevent its being confounded with that shell. It has somewhat the aspect of *U. marginalis*, Lam., but is not so transverse. It is perhaps most closely allied to *U. lamellatus* (nobis) from the Ganges. There are a few obscure rays near the beaks and two well defined ones on the posterior slope. At the request of Mr. Cuming I have named this after the gentleman who brought it from Ceylon to London.

UNIO JAPANENSIS. Pl. 36, fig. 123.

Testâ plicatâ, oblongâ, anticè subsulcatâ, subcompressâ, posticè subbiangulatâ, valdè inæquilaterali; valvulis crassiusculis, anticè paulisper crassioribus; natibus prominulis; epidermide tenebroso-fuscâ, micante; dentibus cardinalibus subgrandibus, elevatis, crenulatis, in utroque valvulo duplicibus; lateralibus longis subcurvisque; margaritâ albâ et valdè iridescente.

Shell plicate, oblong, somewhat sulcate before, somewhat compressed, subbiangular behind, very inequilateral; valves rather thick, thicker before; beaks slightly prominent; epidermis dark brown, rather shining; cardinal teeth rather large, elevated, crenulate, double in both valves; lateral teeth long and somewhat curved; nacre white and very iridescent.

Unio Japanensis, Lea. Proc. Acad. Nat. Sci., 1859, p. 153.

Hab.—Japan. H. Cuming.

My cabinet and cabinets of Mr. Cuming and C. M. Wheatley.

Diam. .6, Length 1.2, Breadth 1.9 inch.

Shell plicate on the upper half of the disk, oblong, somewhat sulcate on the anterior portion, subbiangular behind, rather compressed, very inequilateral; dorsal and basal margins nearly parallel; substance of the shell rather thick, slightly thicker before; beaks slightly prominent; ligament rather long, thin, light brown; epidermis very dark brown, lighter on the lower part; umbonial slope flattened; cardinal teeth rather large, elevated, crenulate, double in both valves; lateral teeth long, somewhat curved; anterior cicatrices distinct, well impressed; posterior cicatrices confluent, rather indistinct; dorsal cicatrices small and placed on the plate in the cavity of the beaks; cavity of the shell very shallow; cavity of the beaks small and angular; nacre white and very iridescent.

Remarks.—Two specimens are before me. The more perfect and smaller one is figured. Both are much eroded at the beaks, hence that part is not described. I have no doubt, however, that the folds, which commence about half way from the basal margin are, in perfect specimens, continued to the apex, where they may assume the form of granules or very small plications. In young and perfect specimens the epidermis towards the beaks will probably be found to be greenish, as the better specimen of the two indicates. It is perhaps nearest to *ellipticus* (nobis) leaning towards *Hembeli*, Con. It is more compressed than the former and not so wide as the latter, and in the folds it differs from both.

UNIO NAVIGIOLIFORMIS. Pl. 37, fig. 124.

Testâ minutè plicatâ, valdè oblongâ, subinflatâ, valdè inæquilaterali, posticè truncatâ et subemarginatâ, ad basim emarginatâ, anticè ovato-rotundatâ; valvulis crassiusculis; natibus prominulis; epidermide tenebroso-fuscâ, eradiatâ, micante; dentibus cardinalibus crassiusculis, obliquis, compressis, in utroque valvulo duplicibus; lateralibus prælongis subcurvisque; margaritâ albâ et iridescente.

Shell minutely plicate, very oblong, somewhat inflated, very inequilateral, truncate and subemarginate behind, emarginate at base, ovately rounded before; valves somewhat thick; beaks slightly prominent; epidermis dark brown, without rays, shining; cardinal teeth somewhat thick, oblique, compressed and double in both valves; lateral teeth very long and slightly curved; nacre white and iridescent.

Unio navigioliformis, Lea. Proc. Acad. Nat. Sci., 1859, p. 152.

Hab.— ———? H. Cuming.

Cabinet of Mr. Cuming.

Diam. .6, Length 1, Breadth 2.1 inches.

Shell with small folds, very oblong, somewhat inflated, very inequilateral, truncate and subemarginate behind, emarginate at base, ovately rounded before; substance of the shell somewhat thick; beaks slightly prominent; ligament very long, thin and dark brown; epidermis dark brown, without rays, shining, with regular transverse striæ, which cut very minute perpendicular folds and give the side a subgranular appearance; umbonial slope somewhat raised and rounded; posterior slope nearly filled with oblique rays and having an impressed line from each beak to the margin, where the valves are open; cardinal teeth somewhat thick, oblique, compressed and double in both valves; lateral teeth very long and somewhat curved; anterior cicatrices confluent, as regards the lower one, but distinct from the upper one; posterior cicatrices confluent; dorsal cicatrices placed in a row across the cavity of the beaks; cavity of the shell rather deep and wide; cavity of the beaks very shallow and rounded; nacre white and iridescent.

Remarks.—Mr. Cuming has no idea of the habitat of this species, a single specimen only of which he obtained. I am disposed to think that it is from South America. It reminds one of *U. parallelopipedon*, (nobis,) but is not so wide nor so oblique, and

it has folds which that species has not. It is evidently a small species. The beaks of the individual before me are very much eroded, therefore the character of that important part cannot be determined, but I have no doubt that perfect specimens will display beautifully undulated tips, as the delicate folds which exist on the posterior slope and which also can be observed on the anterior slope, indicate that the whole of the superior portion is covered with them.

UNIO THWAITESII. Pl. 37, fig. 125.

Testâ lævi, regulariter ellipticâ, subinflatâ, inæquilaterali; valvulis crassiusculis; natibus prominulis; epidermide castaneâ, politâ, transversè fasciatâ; dentibus cardinalibus valdè compressis, lamellatis, valdè obliquis, in utroque valvulo duplicibus; lateralibus longis, lamellatis curvisque; margaritâ salmonis colore tinctâ et iridescente.

Shell smooth, regularly elliptical, somewhat inflated, inequilateral; valves somewhat thick; beaks a little prominent; epidermis chestnut brown, polished and transversely banded; cardinal teeth very much compressed; lamellar teeth very oblique and double in both valves; lateral teeth long, lamellar and curved; nacre salmon colored and iridescent.

Unio Thwaitesii, Lea. Proc. Acad. Nat. Sci., 1859, p. 152.

Hab.—Ceylon. Mr. Thwaites.

Cabinet of H. Cuming.

Diam. .9,

Length 1.5,

Breadth 2.6 inches.

Shell smooth, regularly elliptical, somewhat inflated, inequilateral; substance of the shell somewhat thick; beaks a little prominent; ligament rather long, thin and light brown; epidermis chestnut brown, very smooth and polished, with somewhat distant marks of growth and with several broad, transverse, yellowish bands, very obscurely rayed; umbonial slope raised and subangular; cardinal teeth very much compressed, lamellar, very oblique, slightly striate and double in both valves; lateral teeth long, lamellar and curved, the inferior division in the left valve being much the larger; anterior cicatrices distinct, but not deeply impressed; posterior cicatrices confluent; dorsal cicatrices placed in the centre of the cavity of the beaks; pallial cicatrices not well impressed; cavity of the shell rather deep; cavity of the beak shallow and rounded; nacre salmon colored and iridescent.

Remarks.—A single specimen only was submitted to me by Mr. Cuming, who received it from Mr. Thwaites of Ceylon. It is very remarkable that this shell has so strong a resemblance on the exterior to *U. umbrosus* (nobis), from Mexico, that no naturalist would think of separating them if it were not for the difference of the interior characters, and particularly in the teeth, especially the cardinal tooth, which is of a totally different type. In the *umbrosus* it is massive, pyramidal and strongly crenulate, while in the *Thwaitesii* it is thin, long, lamellar and scarcely striate. The

lateral teeth are also thinner. In the former, the cicatrices are much more deeply impressed and the nacre is of a rose color, while in the latter it is a rich salmon. In neither of the specimens of these two species have I seen one with the beaks perfect enough to present the important characters of them. I have no doubt they will be found to differ when they shall be observed in that condition.

UNIO PLICATULUS. Pl. 37, fig. 126.

Testâ minutè plicatâ, valdè oblongâ, compressâ, valdè inæquilaterali, posticè obtusè angulatâ; valvulis tenuibus; natibus prominulis; epidermide luteo-fuscâ, radiatâ; dentibus cardinalibus obliquis, lamellatis, longis, pertenuibus, dente cardinali valvulæ dextræ, duplice; lateralibus longis, acicularis rectisque; margaritâ cæruleo-albâ et valdè iridescente.

Shell minutely plicate, very oblong, compressed, very inequilateral, obtusely angular behind; valves thin; beaks a little prominent; epidermis yellowish brown and radiated; cardinal teeth oblique, lamellar, long, very thin and double in the right valve; lateral teeth long, needle-shaped and straight; nacre bluish white and very iridescent.

Unio plicatulus, Lea. Proc. Acad. Nat. Sci., 1859, p. 152.

Hab.—Borneo. Mr. Cuming.

Cabinet of Mr. Cuming.

Diam. .5,

Length .9,

Breadth 1.9 inches.

Shell with small folds, very oblong, compressed, very inequilateral, obtusely angular behind; substance of the shell thin; beaks a little prominent; ligament thin, long and light brown; epidermis yellowish brown, nearly covered with green rays, which are more numerous and broader on the posterior half; marks of growth distant; umbonial slope slightly raised into an obtuse angle; posterior slope compressed, raised into a keel and covered with minute closely set folds nearly to the margin; cardinal teeth oblique, lamellar, long, very thin, *double* in the *right* and *single* in the left valve; lateral teeth long, needle-shaped and straight; anterior cicatrices confluent; posterior cicatrices confluent; dorsal cicatrix very small and placed nearly in the centre of the cavity of the beaks; cavity of the shell very shallow; cavity of the beaks very shallow and slightly angular; nacre bluish white and very iridescent.

Remarks.—The specimen above described is the only one I have seen, and the characters may be found in other and more perfect individuals to vary in some degree. The beaks being eroded do not exhibit of course the character of the tips. Judging from the folds, which are closely set, up to the eroded portion, I should suppose that the whole region would be very beautifully covered with diminishing ones to the tip. These delicate, thickly set folds are very regular and nearly parallel, extending not only nearly over the whole posterior slope, but round the beak and

probably over the whole of it. On the side they are nearly perpendicular, but on the posterior slope they are oblique, and as they join on the umbonial slope they make an angle there of nearly 90° . The folds are quite observable in the nacre of the interior. The rays on the posterior portion are very distinct, of a dark green, and so broad on the umbonial slope as to give it a dark greenish hue. The transverse striae are very well marked, almost amounting to sulcations. A marked characteristic of this species is, that the double cardinal tooth is in the *right valve* and the single one in the *left*.

UNIO MUTABILIS. Pl. 38, fig. 127.

Testâ lævi, latè ellipticâ, subcompressâ, valdè inæquilaterali, ad basim subrectâ; valvulis tenuibus, anticè crassioribus; natibus prominulis, ad apices undulatis, ferè terminalibus; epidermide castaneâ, nitidâ et eradiatâ; dentibus cardinalibus parvis, in utroque valvulo duplicibus; lateralibus prælongis subcurvisque; margaritâ cæruleo-albâ et valdè iridescente.

Shell smooth, widely elliptical, compressed, very inequilateral, nearly straight at the base; valves thin, thicker before; beaks a little prominent, undulate at the tips and nearly terminal; epidermis chestnut brown, shining and without rays; cardinal teeth small and double in both valves; lateral teeth very long and slightly curved; nacre bluish white and very iridescent.

Unio mutabilis, Lea. Proc. Acad. Nat. Sci., 1859, p. 152.

Hab.—Brisbane water, Australia, New Zealand. H. Cuming; and Murray river, Australia. W. Newcomb, M. D.

My cabinet and cabinets of Mr. Cuming and Dr. Newcomb.

Diam. .5,

Length 1,

Breadth 2.1 inches.

Shell smooth, widely elliptical, compressed, very inequilateral, nearly straight at the base; substance of the shell thin, thicker before; beaks a little prominent, with radiate undulations at the tips and nearly terminal; ligament rather long, thin and reddish; epidermis chestnut brown, shining, with distant marks of growth; umbonial slope raised and rounded; posterior slope compressed and raised into a keel; cardinal teeth small and double in both valves; lateral teeth long, acicular and slightly curved; anterior cicatrices confluent, as regards the lower one, but distinct from the upper one; posterior cicatrices confluent; dorsal cicatrices in a row posterior to the centre of the cavity of the beaks; cavity of the shell rather shallow; cavity of the beaks scarcely observable; nacre bluish white and very iridescent.

Remarks.—I have four specimens of this shell before me. Three from Mr. Cuming and one from Dr. Newcomb. They are of three different ages and have quite dissimilar aspects. The oldest is from Brisbane Water and is three inches wide. The nacre is much thickened, the epidermis blackish and the beaks greatly eroded. The next age is from New Zealand, is two and one-quarter inches wide and is in nearly a perfect condition. This is the one figured, and the description is made from it. The two

remaining are quite young, being one and a half inches wide. One of them is from Murray river, the other has no habitat. In general outline it is near to *auratus*, Swain., but it is thinner and the axis minor of the ellipse is greater.

UNIO VITTATUS. Pl. 38, fig. 128.

Testâ crebrè et leviter sulcatâ, ellipticâ, inflatâ, inæquilaterali; valvulis crassiusculis, anticè crassioribus; natibus prominentibus; epidermide luteo-olivâ, nitidâ, eradiatâ, transversè vittatâ; dentibus cardinalibus sublongis, compressis, obliquis; lateralibus longis, lamellatis subcurvisque; margaritâ albâ et iridescente.

Shell closely and delicately sulcate, elliptical, inflated, inequilateral; valves a little thickened, thicker before; beaks rather prominent; epidermis yellowish olive, shining, without rays, transversely banded; cardinal teeth rather long, compressed, oblique; lateral teeth long, lamellar and somewhat curved; nacre white and iridescent.

Unio vittatus, Lea. Proc. Acad. Nat. Sci., 1859, p. 153.

Hab.—Australia. H. Cuming.

My cabinet and cabinet of Mr. Cuming.

Diam. .9,

Length 1.7,

Breadth 2.5 inches.

Shell closely and delicately sulcate, elliptical, inflated, inequilateral; beaks rather prominent; substance of the shell a little thickened, thicker before; ligament long, rather narrow and brown; epidermis yellowish olive, shining, without rays, transversely banded at the somewhat distant lines of growth; umbonial slope raised and rounded; cardinal teeth rather long; compressed, oblique, *double* in the *right* and *single* in the *left* valve; lateral teeth long, lamellar and somewhat curved; anterior cicatrices rather large and confluent; posterior cicatrices large and confluent; dorsal cicatrices placed in a row across the cavity of the beaks; cavity of the shell rather deeply excavated and rounded; cavity of the beaks very shallow and rounded; nacre white and iridescent.

Remarks.—There are two specimens before me, the larger one much the more perfect, and from it the figure is made. This belongs to the cabinet of Mr. Cuming. The inferior one is smaller and much eroded at the beaks, and consequently somewhat thrown out of its normal outline. This Mr. Cuming kindly permits me to place in my cabinet. On both of these the well marked lines of growth form a striking character, being dark brown and very regular. On the more perfect specimen these are further apart and more distinct. The beaks not being perfect in either, the character cannot be given, they may be slightly undulate at the tip. In outline this is near to *Cambodiensis*, (nobis), and *Mauritianus*, (nobis), but it is much larger than either, and is a thinner shell than the former and a thicker one than the latter.

UNIO MELLEUS. Pl. 38, fig. 129.

Testâ sulcatâ, ellipticâ, subinflâtâ, valdè inæquilaterali; valvulis subcrassis, anticè crassioribus; natibus subprominentibus, ad apices minutè undulatis; epidermide melinâ, obsoletè radiatâ, nitidâ; dentibus cardinalibus subgrandibus, erectis, crenulatis, in utroque valvulo duplicibus; lateralibus sublongis, subrectis, in utroque valvulo duplicibus; margaritâ salmonis colore tinctâ et iridescente.

Shell sulcate, elliptical, slightly inflated, very inequilateral; valves rather thick, thicker before; beaks rather prominent and minutely undulate at the tips; epidermis honey yellow, obsoletely rayed and bright; cardinal teeth rather large, erect, crenulate and double in both valves; lateral teeth rather long, nearly straight and double in both valves; nacre salmon colored and iridescent.

Unio melleus, Lea. Proc. Acad. Nat. Sci., 1859, p. 152.

Hab.— ———? H. Cuming.

Cabinet of Mr. Cuming.

Diam. .7,

Length 1.1,

Breadth 2 inches.

Shell sulcate, elliptical, slightly inflated, very inequilateral, obtusely angular behind; substance of the shell rather thick, thicker before; beaks rather prominent, minutely and beautifully undulate at the tips; ligament rather short, thin and light brown; epidermis honey yellow, obscurely rayed, bright, with furrows over nearly the whole disk; umbonial slope slightly raised and rounded; cardinal teeth rather large, erect, crenulate and double in both valves; lateral teeth rather long, nearly straight and double in both valves; anterior cicatrices distinct; posterior cicatrices confluent; dorsal cicatrices placed under the plate, posterior to the cardinal tooth; cavity of the shell rather shallow and rounded; cavity of the beaks rather deep and angular; nacre salmon colored and iridescent.

Remarks.—There was no habitat attached to this specimen, a single one only being sent to me by Mr. Cuming. It is nearest to *aratus*, (nobis), but is a much larger species and is more oblique, and the color is more of a honey yellow.

The most remarkable character of this shell is the *double lateral* tooth in the *right* valve, which, indeed, is disposed to be trifid. That of the left is bifid as usual. The anterior cicatrices are all three distinct and well impressed. This is very unusual. These characters must be taken with some allowance, as we have but a single specimen yet to examine, and in others they may not be so well marked.

UNIO FLUCTIGER. Pl. 39, fig. 130.

Testâ perplicatâ, subtransversâ, compressâ, valdè inæquilaterali, posticè subrotundatâ, ad basim subemarginatâ; valvulis tenuibus; natibus parvis, prominulis; epidermide luteo-olivâ, transversè et minutè striatâ, eradiatâ; dentibus cardinalibus parvis, obliquis, compressis, in utroque valvulo duplicibus; lateralibus longis subrectisque; margaritâ cæruleo-albâ et iridescente.

Shell plicate all over, rather transverse, compressed, very inequilateral, rather

rounded behind, slightly emarginate at base; valves thin; beaks small, slightly prominent; epidermis yellowish olive, minutely and transversely striate, without rays; cardinal teeth small, oblique, compressed and double in both valves; lateral teeth long and nearly straight; nacre bluish white and iridescent.

Unio fluctiger, Lea. Proc. Acad. Nat. Sci., 1859, p. 152.

Hab.— ———? H. Cuming.

Cabinet of Mr. Cuming.

Diam. .4, Length .7, Breadth 1.3 inch.

Shell folded all over, rather transverse, compressed, very inequilateral, rather rounded behind, slightly emarginate at base; substance of the shell thin, thicker before; beaks small, slightly prominent; ligament rather long, very thin and olive color; epidermis yellowish olive, minutely and transversely striate, without rays; the folds, which cover the whole disk, diverge from the point of the beak and extend to the margin, except in the middle, where, coming together, they form a very acute angle, and all are visible on the interior; umbonial slope slightly raised and rounded; posterior slope raised into a small keel; cardinal teeth small, oblique, compressed, crenulate and double in both valves; lateral teeth long and nearly straight; anterior cicatrices confluent, as regards the lower one, but distinct from the upper one; posterior cicatrices confluent; dorsal cicatrices placed in the centre of the cavity of the beaks; cavity of the shell very shallow; cavity of the beaks very shallow and rounded; nacre bluish white and iridescent.

Remarks.—The habitat of this species is unknown to Mr. Cuming, who has but a single specimen. It appears to me to belong to the South American types. In some respects it is very like to *scobinatus*, (nobis), from Siam, but it is a much thinner shell, more compressed and although covered with folds like that species, the character of them is very different, not being green, and they also diverge differently, particularly on the posterior slope. In this specimen the folds are more distinctly marked in the interior than in any species I have seen, as every one may be perfectly traced there. It has some resemblance to *gratiosus*, Phil., and *crispatus*, Gould, but is wider than either and more covered with folds.

UNIO SIKKIMENSIS. Pl. 39, fig. 131.

Testâ lævi, obovatâ, inæquilaterali, subinflatâ, posticè obtusè biangulatâ; valvulis crassiusculis; natibus prominulis; epidermide luteo-fuscâ, eradiatâ; dentibus cardinalibus parvulis, brevibus, crenulatis, in utroque valvulo duplicibus; lateralibus brevibus subcurvisque; margaritâ albâ et iridescente.

Shell smooth, obovate, inequilateral, rather inflated, obtusely biangular behind; valves a little thickened; beaks slightly prominent; epidermis yellowish brown, without rays; cardinal teeth small, short, crenulate and double in both valves; lateral teeth short and somewhat curved; nacre white and iridescent.

Unio Sikkimensis, Lea. Proc. Acad. Nat. Sci., 1859, p. 151.

Hab.—Sikkim, India. H. Cuming and Prof. Hanley.

Cabinets of Mr. Cuming and Prof. Hanley.

Diam. .6, Length .9, Breadth 1.3 inch.

Shell smooth, obovate, inequilateral, rather inflated, obtusely biangular behind; substance of the shell somewhat thick; beaks slightly prominent; ligament very short, thin and yellowish; epidermis yellowish brown, without rays and striate; umbonial slope rounded; cardinal teeth small, short, crenulate and double in both valves; lateral teeth short, somewhat curved, and widely separated from the cardinal teeth; anterior cicatrices distinct, small; posterior cicatrices confluent; dorsal cicatrices situated on the under side of the plate, posterior to the cardinal teeth; cavity of the shell rather deep and rounded; cavity of the beaks somewhat deep and sub-angular; nacre white and iridescent.

Remarks.—I have only seen the two specimens of this small species, which Mr. Cuming and Prof. Hanley have kindly sent for my inspection from England. Neither of them have perfect beaks, and, therefore, the character of the apex cannot be ascertained. The outline is so nearly approaching to roundness that it might almost be classed with the subrotund group. It is not so rotund as *circulus*, (nobis), by any means, but is near to *U. Brownii*, (nobis). It cannot be confounded with that shell, however, for that species is compressed and this is quite inflated.

UNIO DYSONII. Pl. 39, fig. 132.

Testâ sulcatâ, ellipticâ, subinflatâ, inæquilaterali, posticè subbiangulari; valvulis subcrassis, anticè crassioribus; natibus prominulis, ad apices lævibus; epidermide stramineâ, eradiatâ; dentibus cardinalibus crassiusculis, erectis, crenulatis, in utroque valvulo duplicibus; lateralibus longis subcurvisque; margaritâ argenteâ et valdè iridescente.

Shell sulcate, elliptical, somewhat inflated, inequilateral, subbiangular behind; valves rather thick, thicker before; beaks slightly prominent, smooth at the tip; epidermis straw color, without rays; cardinal teeth somewhat thick, erect, crenulate and double in both valves; lateral teeth long and somewhat curved; nacre silver-white and very iridescent.

Unio Dysonii, Lea. Proc. Acad. Nat. Sci. 1859, p. 152.

Hab.—Honduras. D. Dyson.

Cabinet of Mr. Cuming.

Diam. .6, Length 1.1, Breadth 1.8 inch.

Shell sulcate, elliptical, somewhat inflated, inequilateral, subbiangular behind and emarginate at postero-dorsal margin; substance of the shell somewhat thick, thicker before; beaks slightly prominent, pointed at the tip and free from any undulations; ligament not long, rather stout and light brown; epidermis straw yellow, without rays, with very distant marks of growth; umbonial slope slightly raised and rounded; posterior slope slightly raised, with two slightly impressed lines on each valve from the

beak to posterior margin; cardinal teeth somewhat thick, erect, crenulate and double in both valves; lateral teeth long and somewhat curved; anterior cicatrices distinct and well impressed; posterior cicatrices confluent; dorsal cicatrices placed on the under side of the plate and the posterior base of the cardinal tooth; cavity of the shell rather shallow and wide; cavity of the beaks shallow and obtusely angular; nacre silver-white and very iridescent.

Remarks.—A single specimen only before me is from Mr. Cuming. It is a well characterised species and nearest to *aratus* (nobis.) It is, however, a larger and stouter species and its axis major is greater in proportion. Like that shell it is covered with sulcations. Its color is of a deeper yellow. It has some characters like *melleus*, herein described, but it is not so wide, is not so oblique and the sulcations are not so fine as in that species. In the teeth they also differ much. The nacre of *Dysonii* is remarkable for its beautiful pure whiteness. The anterior section of the cardinal tooth in both valves is somewhat bifid in this specimen, but this may not be the case in all other specimens, as it is rarely found so in other species. It may not be a permanent character.

UNIO DEMERARAENSIS. Pl. 39, fig. 133.

Testâ sulcatâ, rhomboido-oblongâ, subinflatâ, inæquilaterali, posticè obtusè angulatâ; valvulis crassiusculis; natibus prominulis, ad apices undulatis divergentibus; epidermide olivo-fuscâ, eradiatâ; dentibus cardinalibus crassiusculis, erectis, striatis, in utroque valvulo duplicibus; lateralibus longis subcurvisque; margaritâ albâ et iridescente.

Shell sulcate, rhomboido-oblong, somewhat inflated, inequilateral, obtusely angular behind; valves somewhat thick; beaks a little prominent, with diverging undulations at the tips; epidermis olive brown, without rays; cardinal teeth not very thick, erect, striate and double in both valves; lateral teeth long and somewhat curved; nacre white and iridescent.

Unio Demeraraensis, Lea. Proc. Acad. Nat. Sci., 1859, p. 152.

Hab.—Demerara. H. Cuming.

Cabinet of Mr. Cuming.

Diam. .5,

Length .9,

Breadth 1.5 inch.

Shell sulcate, rhomboido-oblong, somewhat inflated, inequilateral, obtusely angular behind and rounded before; substance of the shell somewhat thick; beaks a little prominent, with small divergent undulations at the tips; ligament rather long, thin and light brown; epidermis olive brown, without rays, with very indistinct marks of growth; umbonial slope raised and angular; cardinal teeth not very thick, compressed, erect, striate and double in both valves; lateral teeth long and somewhat curved; anterior cicatrices confluent as regards the lower one, but distinct from the upper one; posterior cicatrices confluent; dorsal cicatrices placed across the centre

of the cavity of the beaks; cavity of the shell rather deep and rounded; cavity of the beaks shallow and obtusely angular; nacre white and iridescent.

Remarks.—Like many other species from Mr. Cuming, there was only a single specimen of this. This is always to be regretted, as the individuals of this genus vary so much. In this case the epidermis of one of the valves is bleached, and therefore very different in color from the other. The radiating undulations of the beaks show the South American type. In outline it is near to *merus*, (nobis), and *Mexicanus*, Phil., but is a little more transverse than either and much smaller than the former. It is not so square as *modestus*, Fer., nor is it so much compressed.

UNIO DIMINUTUS. Pl. 39, fig. 134.

Testâ plicatâ, corrugatâ, subsulcatâ, ellipticâ, inæquilaterali, compressâ, posticè obtusè angulatâ; valvulis crassiusculis; natibus subprominentibus, ad apices undulatis acuminatisque: epidermide luteâ eradiatâque: dentibus cardinalibus parviusculis, compressis, erectis, crenulatis, in utroque valvulo duplicibus; lateralibus subbrevibus rectisque; margaritâ pallido-salmoniâ et iridescente.

Shell plicate, shrivelled, somewhat sulcate, elliptical, compressed, inequilateral, obtusely angular behind; valves somewhat thick; beaks rather prominent, undulated and pointed at the tips; epidermis yellow and without rays; cardinal teeth rather small, compressed, erect, crenulate and double in both valves; lateral teeth rather short and straight; nacre pale salmon color and iridescent.

Unio diminutus, Lea. Proc. Acad. Nat. Sci., 1859, p. 151.

Hab.—East Africa. H. Cuming and Prof. Hanley.

Cabinets of Mr. Cuming and Prof. Hanley.

Diam. .4, Length .8, Breadth 1.3 inch.

Shell folded, shrivelled, somewhat sulcate, elliptical, inequilateral, compressed, obtusely angular behind; substance of the shell somewhat thick; beaks rather prominent, undulated and pointed at the tips, the undulations forming an acute angle in the middle; ligament very small and yellowish; epidermis straw yellow, without rays and somewhat shining; umbonial slope slightly raised and rounded; cardinal teeth rather small, compressed, erect, crenulate and double in both valves; lateral teeth rather short and straight; anterior cicatrices distinct and well impressed; posterior cicatrices confluent; dorsal cicatrices on the plate within the cavity of the beaks; cavity of the shell rather shallow; cavity of the beaks rather shallow and angular; nacre pale salmon color, satin-like and iridescent.

Remarks.—The two specimens before me of this small and interesting species are all I have ever seen of it. That from Mr. Cuming is very perfect and nearly double the size of Prof. Hanley's, which is evidently a young individual. The corrugate and shrivelled appearance of the surface is occasioned by transverse furrows which meet with the small folds and cut them abruptly. These furrows are well characterised on

the posterior and anterior portions as well as along the basal margin. The folds being well pronounced, cause them to be observed on the interior, and soften the nacre, which has a beautiful satin-like appearance. The successive folds on the tip form a beautiful line of acute angles on the middle.

UNIO PERSULCATUS. Pl. 40, fig. 135.

Testâ crebrè sulcatâ, oblongâ, valdè inæquilateralî, compressâ, posticè subangulatâ; valvulis suberassis; natibus prominulis; epidermide virido-fuscâ, radiis capillaris; dentibus cardinalibus magnis, sulcatis crenulatisque; lateralibus sublongis rectisque; margaritâ purpureâ et valdè iridescente.

Shell closely sulcate, oblong, very inequilateral, compressed, subangular behind; valves rather thick; beaks somewhat prominent; epidermis greenish brown, with numerous hair-like rays; cardinal teeth large, sulcate and crenulate; lateral teeth rather long and straight; nacre purple and very iridescent.

Unio persulcatus, Lea. Proc. Acad. Nat. Sci., 1859, p. 153.

Hab.—Mexico. Prof. Hanley.

Cabinet of Prof. Hanley.

Diam. .6,

Length 1.1,

Breadth 2 inches.

Shell closely and minutely sulcate, oblong, very inequilateral, compressed, subangular behind, slightly curved at the base; substance of the shell rather thick; beaks somewhat prominent, nearly terminal; ligament rather short and thin; epidermis greenish brown, with numerous hair-like rays over the disk, but more distinctly marked on the posterior slope, where there is a yellow band from beak to margin; umbonial slope slightly raised into an obtuse angle; posterior slope compressed and raised into a sharp keel; cardinal teeth large, sulcate and crenulate; lateral teeth rather long and straight; anterior cicatrices distinct and well impressed; posterior cicatrices distinct; dorsal cicatrices numerous, well impressed and extending from the centre of the cavity along the base of the cardinal tooth; cavity of the shell very shallow; cavity of the beaks shallow and subangular; nacre rather dark purple very and iridescent.

Remarks.—A single specimen only of this remarkable species was submitted to me by Prof. Hanley. It simply has the habitat "Mexico" upon it. The most prominent character, which strikes the observer at once, is the closely set, transverse, parallel furrows which cover the whole disk and probably reach to the tips of the beaks, which, unfortunately, in this specimen are eroded. The yellow band on each valve, reaching from the beaks to the posterior dorsal margin is very unusual. The purple nacre is very fine and in some lights gives a copper color. In outline it has a very close affinity to some of our various forms of *complanatus*. The capillary rays on the posterior slope are very beautiful and well defined.

UNIO ROWELLII. Pl. 40, fig. 136.

Testâ sulcatâ, ellipticâ, subinflatâ, posticè obtusè angulatâ, inæquilaterali; valvulis suberassis, anticè paulisper crassioribus; natibus prominulis, ad apices undulatis; epidermide rufo-fuscâ, obsoletè radiatâ; dentibus cardinalibus compressis, elevatis, crenulatis, in utroque valvulo duplicibus; laterilibus subrectis sublongisque; margaritâ albâ et iridescente.

Shell sulcate, elliptical, rather inflated, obtusely angular behind, inequilateral; valves rather thick, a little thicker before; beaks slightly prominent, undulate at the tips; epidermis reddish brown, obsoletely radiated; cardinal teeth compressed, raised, crenulate, double in both valves; lateral teeth nearly straight and rather long; nacre white and iridescent.

Unio Rowellii, Lea. Proc. Acad. Nat. Sci., 1859, p. 153.

Hab.—Chargres River, New Granada. Rev. Joseph Rowell.

My cabinet and cabinet of Wm. Cooper, Esq.

Diam. .6,

Length 1,

Breadth 1.7 inch.

Shell sulcate, elliptical, rather inflated, obtusely angular behind, inequilateral; substance of the shell rather thick, thickened before; beaks slightly prominent, minutely undulate at the tip; ligament rather short, somewhat thick and light brown; epidermis reddish brown, inclining to olive, obscurely rayed; umbonial slope slightly raised and rounded; posterior slope very slightly raised, with two obscure, impressed lines on each valve, from the beaks to posterior margin; cardinal teeth compressed, raised, crenulate, double in both valves; lateral teeth nearly straight and rather long; anterior cicatrices distinct and well impressed; posterior cicatrices confluent; dorsal cicatrices placed under the plate, posterior to cardinal teeth; cavity of the shell rather deep and rounded; cavity of the beaks rather deep and subangular; nacre white and iridescent.

Remarks.—In outline this species is very near to *Oregonensis*, (nobis). It is, however, of a more narrow ellipse and differs in being sulcate. The nacre is essentially white, but in a few specimens there is a disposition to a yellowish tint. It is also allied to *Goascoranensis*, (nobis), but it is not so thin and compressed, while in outline it is very nearly of the same ellipse. The undulations of the tips are small and few. This species is dedicated to the reverend gentleman who discovered it. I owe the possession of several specimens to my friend Judge Cooper, who received them from the Rev. Mr. Rowell.

UNIO WILSONII. Pl. 40, fig. 137.

Testâ crebrè et leviter sulcatâ, transversè ellipticâ, subinflatâ, valdè inæquilaterali; valvulis tenuibus; natibus prominentibus, ad apices lævibus; epidermide olivo-viridescente, nitidâ, obsoletè radiatâ; dentibus cardinalibus parvis, lamellatis et obliquis; laterilibus longis, acicularis subrectisque; margaritâ cæruleo-albâ et iridescente.

Shell closely and delicately sulcate, transversely elliptical, somewhat inflated, very inequilateral; valves thin; beaks rather prominent, smooth at the tip; epidermis olive-green, shining, obscurely rayed; cardinal teeth small, lamellar and oblique; lateral teeth long, acicular and nearly straight; nacre bluish white and iridescent.

Unio Wilsonii, Lea. Proc. Acad. Nat. Sci., 1859, p. 153.

Hab.—Eastern Branch of Isaac's Plain, New South Wales. T. B. Wilson, M. D.

Cabinet of the Academy of Natural Sciences.

Diam. .6, Length 1, Breadth 1.9 inch.

Shell closely and delicately sulcate, transversely elliptical, somewhat inflated, very inequilateral; valves thin; beaks rather prominent, pointed at the tip and free from any undulations; ligament short, very thin and light brown; epidermis olive green, shining, obscurely rayed, and with distant marks of growth; umbonial slope slightly raised and rounded; cardinal teeth small, lamellar, oblique, *double* in the *right* and *single* in the *left* valve; lateral teeth long, acicular and nearly straight; anterior cicatrices confluent and scarcely perceptible; posterior cicatrices confluent and scarcely perceptible; dorsal cicatrices placed in the centre of the cavity of the beaks; cavity of the shell rather deep and rounded; cavity of the beaks shallow and subangular; nacre bluish white and iridescent.

Remarks.—Only a single specimen of this species was received by Dr. Wilson. It is a very simple species, with no marked character but that of the cardinal tooth being double in the right valve, which is not very uncommon in the Asiatic species, when the teeth are lamellar. In outline it closely resembles *U. inornatus*, (nobis), from Siam. It is a little more transverse, and the epidermis is darker, being more olive than yellow. I name it after Dr. Wilson, who kindly submitted it to my examination.

UNIO MAURITIANUS. Pl. 40, fig. 138.

Testâ lævi, ellipticâ, compressâ, inæquilaterali; valvulis pertenuibus; niatibus prominulis; epidermide olivo-luteâ, nitidâ, obsoletè radiatâ; dentibus cardinalibus minimis, compressis, obliquis; lateralibus longis, acicularis subcurvisque; margaritâ albâ et paulisper iridescente.

Shell smooth, elliptical, compressed, inequilateral; valves very thin; beaks slightly prominent; epidermis olive yellow, shining, obscurely radiate; cardinal teeth very small, compressed and oblique; lateral teeth long, acicular and somewhat curved; nacre white and slightly iridescent.

Unio Mauritianus, Lea. Proc. Acad. Nat. Sci., 1859, p. 152.

Hab.—Island of Mauritius. H. Cuming.

Cabinet of Mr. Cuming.

Diam. .5, Length .8, Breadth 1.3 inch.

Shell smooth, elliptical, compressed, inequilateral; substance of the shell very thin, semitranslucent; beaks slightly prominent; ligament very long and thin; epidermis

olive-yellow, shining, obscurely radiate, with not very distant lines of growth; umbonial slope slightly raised and rounded; cardinal teeth very small, compressed, oblique, *double* in the *right* and *single* in the *left* valve; lateral teeth long, acicular and somewhat curved; anterior cicatrices confluent and very slightly impressed; posterior cicatrices confluent; dorsal cicatrices in a row across the cavity of the beaks; cavity of the shell somewhat deep and rounded; cavity of the beaks shallow and rounded; nacre white and slightly iridescent.

Remarks.—This small species, the description of which is made from a single specimen, has the usual type of the *Uniones* from the Asiatic Islands. And, what is not uncommon in species from that quarter of the globe, it has its lamellate cardinal tooth *double* in the *right* and *single* in the *left* valve. In outline it is very near to *affinis*, (nobis), but is a much smaller, thinner and more compressed shell.

UNIO GOASCORANENSIS. Pl. 41, fig. 139.

Testâ lævi, ellipticâ, subcompressâ, posticè obtusè angulatâ, valdè inæquilaterali; valvulis subcrassis, anticè crassioribus; natibus prominulis; epidermide fuscescente, transversè striatâ; dentibus cardinalibus parviusculis, suberectis crenulatisque; lateralibus sublongis suberectisque; margaritâ albâ et iridescente.

Shell smooth, elliptical, rather compressed, obtusely angular behind, very inequilateral; valves rather thick, thicker before; beaks a little prominent; epidermis brownish, transversely striate; cardinal teeth rather small, somewhat erect and crenulate; lateral teeth rather long and nearly straight; nacre white and iridescent.

Unio Goascoranensis, Lea. Proc. Acad. Nat. Sci., 1859, p. 118.

Hab.—River Goascoran, Honduras, Pacific Slope. J. L. Le Conte, M. D.

My cabinet and cabinets of Major Le Conte and Academy of Natural Sciences.

Diam. .8, Length 1.3, Breadth 2.3 inches.

Shell smooth, elliptical, rather compressed, obtusely angular behind, very inequilateral, obliquely rounded before; substance of the shell rather thick, thicker before; beaks a little prominent; ligament rather long, somewhat thick and dark brown; epidermis brownish, sometimes inclined to olive, transversely striate, almost furrowed; umbonial slope rather low and flattish; posterior slope rather narrow and but slightly raised; cardinal teeth rather small, somewhat erect, crenulate, disposed to duplication in the right and double in the left valve; lateral teeth rather long and nearly straight, enlarged towards the end; anterior cicatrices distinct and well impressed; posterior cicatrices distinct and moderately well impressed; dorsal cicatrices placed across the centre of the cavity of the beaks; cavity of the shell moderately deep; cavity of the beaks shallow and obtusely angular; nacre white and iridescent.

Soft parts.—*Branchial uterus* ——. No ova were found in the only specimen received. It is probably a male. *Branchiæ* rather large, very thin, slightly curved below, inner one rather the larger, free nearly the whole length of abdominal sack.

Palpi rather large, suboval, open nearly the whole length of posterior edge. *Mantle* thin, thicker along the edge, and bordered with black. *Branchial opening* rather large, with numerous, rather small, brownish papillæ. *Anal opening* large, with numerous small, brownish papillæ. *Super-anal opening* large, bordered with black and united below. Color of the mass whitish.

Remarks.—A number of very much eroded specimens were obtained by Dr. Le Conte in his late travels in Honduras, and one specimen only was obtained in alcohol. In outline this species is near to *subangulatus*, (nobis), and to *Rowellii*, (nobis), from Chagres. It would be more likely to be confounded with the latter than any other species I am acquainted with. It is of nearly the same color in the epidermis, but may be distinguished by not being sulcate, in being more inequilateral and more compressed. The older specimens have no rays, but the young ones have a few obscure rays. None of the specimens had perfect beaks; they were all too much eroded to shew undulations, if any ever existed on them. This and *Unio scamnatus*, More., are the only two species of the family *Unionidæ* found by Dr. Le Conte in Honduras. It is an interesting fact that *scamnatus* should inhabit Honduras as well as Cuba, separated as the two habitats are by the Carribean Sea. The *scamnatus* was found at Cumayagua.

UNIO SCAMNATUS.

Unio Scamnatus, Morelet. Test. Nov., No. 1, p. 30.

Unio Gundlachi, Dunker. Prof. Poey's letter.

Soft parts.—*Branchial uterus* ——. No ova were found, either in the branchiæ or abdominal sack of seven specimens received in alcohol. *Branchiæ* large, curved below, the inner one much the larger, free nearly the whole length of abdominal sack. *Palpi* very small, angular, united only for a very short distance on the posterior edge. *Mantle* thin, thickened on the margin where it is slightly colored. *Branchial opening* large, with numerous small, brown papillæ on the inner edges. *Anal opening* rather large, with numerous very small papillæ on the inner edges. *Super-anal opening* small, edge with a delicate deep brown line. Color of the mass dirty white.

Remarks.—This well characterised sulcate species, first observed by the late Mr. Morelet, of Geneva, has been, until lately, considered to be peculiar to Cuba, but recently it has been found by J. L. Le Conte, M. D., in Honduras, at Cumayagua, and to this intelligent naturalist I am indebted for a suite of different ages from that habitat. It is remarkable that no other species of *Unionidæ* has been found in the West India Islands, and that this should inhabit both sides of the Carribean Sea. I am aware that other species have been reported from other Islands, but I have doubts of the authenticity of the statements. From time to time Prof. Poey, of Havana,

has kindly sent me suites of this interesting *Unio* without the soft parts, but recently both he and Prof. Holmes, of Charleston, S. C., have kindly supplied me with perfect specimens in alcohol, which enabled me carefully to examine the soft parts and to describe them. Unfortunately neither of seven specimens received had ova, so that the form of the *embryo* or that of the *branchial* uterus could be described.

ANODONTA SENEGALENSIS. Pl. 41, fig. 140.

Testâ lævi, transversâ, subinflatâ, ad latere vel planulatâ vel compressâ, ad basim subemarginatâ, valdè inæquilaterali; valvulis crassiusculis; natibus subprominentibus, ad apices minutè et obliquè undulatis; epidermide tenebroso-viridescente, nitidâ, eradiatâ; margaritâ vel cæruleo-albâ vel salmonis colore tinctâ et iridescente.

Shell smooth, transverse, rather inflated, flattened or compressed at the side, subemarginate at the base, very inequilateral; valves somewhat thick; beaks somewhat prominent, minutely and obliquely undulate at the tip; epidermis dark green, shining and without rays; nacre bluish white or salmon color and iridescent.

Anodonta Senegalensis, Lea. Proc. Acad. Nat. Sci., 1859, p. 154.

Hab.—Senegal. J. C. Jay, M. D., E. Verreaux and H. Cuming.

My cabinet and cabinets of Dr. Jay, Mr. Verreaux and Mr. Cuming.

Diam. 1.1, Length 1.5, Breadth 3.4 inches.

Shell smooth, transverse, rather inflated, flattened or compressed at the sides, subemarginate at the base, very inequilateral, dorsal and basal lines nearly parallel, obtusely angular behind; substance of the shell somewhat thick; beaks somewhat prominent, minutely and obliquely undulate at the tip; ligament long, narrow and dark brown; epidermis dark green, inclining to olive, shining, without rays and with distant marks of growth; umbonial slope somewhat raised and rounded; posterior slope raised into a keel and with two slightly impressed lines on each valve, from the beaks to the posterior margin; dorsal line with a small longitudinal callus in the left valve under the beak; anterior cicatrices large and distinct, the inferior one being very large in proportion and transverse; posterior cicatrices large and confluent; dorsal cicatrices single in each valve and placed nearly in the centre of the cavity of the beaks; cavity of the shell rather deep and rounded; cavity of the beaks very shallow and subangular; nacre bluish white or salmon color and iridescent.

Remarks.—I have had a young shell of this species in my collection received many years since from Dr. Jay. Subsequently, in 1853, I procured a still younger one from Mr. Verreaux in Paris. More recently I recognised two adult specimens among the *Unionidæ* sent to me by Mr. Cuming from his collection. The oldest of these is nearly three and a half inches wide and is quite a thick shell, and the nacre finely tinted with salmon color. The younger ones are thin and light, and of a bluish white nacre and lighter green epidermis. The beaks of all but two young specimens are eroded

and do not shew any undulations, but the two young ones have delicate, nearly parallel undulations running from the tip obliquely on the posterior slope, and the anterior slope has also a few indistinct ones. One of the two specimens from Mr. Cuming is marked from "Rio Macacu, Brazil," but I think this must be an error. It is not likely that the same species should exist in the rivers of South America and Africa. This species cannot be confounded with *An. arcuata*, Fer., which is a ponderous arcuate species from the Nile, although in some characters it resembles that shell. The *Senegalensis* is more transverse, of a darker green and less ponderous.

ANODONTA DAHOMEYENSIS. Pl. 41, fig. 141.

Testâ lævi, transversâ, subinflatâ, ad latere compressâ, ad basim emarginatâ, valdè inæquilaterali; valvulis tenuibus; natibus subprominentibus; epidermide tenebroso-olivâ, striatâ, eradiatâ; margaritâ cæruleo-albâ et iridescente.

Shell smooth, transverse, somewhat inflated, compressed at the side, emarginate at base, very inequilateral; valves thin; beaks somewhat prominent; epidermis dark olive, striate, without rays; nacre bluish white and iridescent.

Anodonta Dahomeyensis, Lea. Proc. Acad. Nat. Sci., 1859, p. 154.

Hab.—Dahomey, West Africa. Mr. Frazer.

Cabinet of Mr. Cuming.

Diam. .7,

Length 1,

Breadth 2.2 inches.

Shell smooth, transverse, somewhat inflated, compressed at the side, emarginate at base, very inequilateral, obtusely angular behind; dorsal and basal lines nearly parallel; substance of the shell thin; beaks somewhat prominent; ligament long, thin and light brown; epidermis dark olive, transversely striate, without rays, with somewhat distant marks of growth; umbonial slope somewhat raised and much rounded; posterior slope raised into a small keel and having one slightly impressed line on each valve from the beaks to the posterior margin; anterior cicatrices large and distinct, the inferior one being very large in proportion and transverse; posterior cicatrices rather large and confluent; dorsal cicatrices single in each valve, deeply impressed and placed nearly in the centre of the cavity of the beaks; cavity of the shell rather deep and somewhat rounded; cavity of the beaks very shallow and subangular; nacre bluish white and iridescent.

Remarks.—A single specimen only has been submitted to me by Mr. Cuming, and this with very much eroded beaks, so that nothing can be said in regard to the character of their undulations, if they have any. It is always to be regretted to be compelled to make a diagnosis from a single specimen, as has sometimes been done in this paper. Some of the characters mentioned may not be persistent with specimens from different habitats and of different ages or sexes. This should always have consideration by the student of natural history. This species is closely allied to *Senegalensis* herein described, but it differs in several characters. It is larger and rounder over the

umbonial slope, has one impressed line only on the posterior slope of each valve, is smaller and more delicate, is more compressed on the side, and the color of the epidermis is not so green and shining.

MONOCONDYLÆA PLANULATA. Pl. 42, fig. 142.

Testâ alâtâ, lævi, obovatâ, valdè compressâ, ad latere planulatâ, valdè inæquilaterali, posticè obtusè angulatâ, anticè rotundâ; valvulis tenuissimis, pellucidis; natibus vix prominentibus; epidermide minutissimè striâtâ, luteolâ, posticè subnitidâ, obsoletè radiatâ; dentibus cardinalibus parvissimis, compresso-tuberculatis, in utroque valvulo singulis; margaritâ cæruleo-albâ et iridescente.

Shell winged, smooth, obovate, very much compressed, flattened at the sides, very inequilateral, obtusely angular behind and rounded before; valves very thin, diaphanous; beaks scarcely prominent; epidermis most minutely striate, yellowish, somewhat shining, obscurely radiated; cardinal teeth very small, compressed, tuberculate and single in both valves; nacre bluish white and iridescent.

Monocondylæa planulata, Lea. Proc. Acad. Nat. Sci., 1859, p. 187.

Hab.—Java. G. Von dem Busch, M. D.

My cabinet and cabinet of Dr. Von dem Busch. Bremen.

Diam. .5,

Length 1.2,

Breadth 1.9 inch.

Shell winged, smooth, obovate, very much compressed, flattened at the sides; very inequilateral, obtusely angular behind and rounded before; substance of the shell semi-transparent; beaks scarcely prominent, apparently without undulations at the tips; ligament long, thin and concealed; epidermis most minutely and transversely striate, somewhat shining, yellowish, very obscurely radiated, on the posterior slope green, with scarcely visible marks of growth; umbonial slope slightly raised and slightly rounded; posterior slope pale green, narrow, raised into a compressed wing enclosing the ligament and slightly wrinkled; cardinal teeth very small, compressed, tuberculate and single in both valves; anterior cicatrices confluent, slightly impressed, rather large; posterior cicatrices confluent, very slightly impressed and large; dorsal cicatrices in a row across the cavity of the beaks and very slightly impressed; cavity of the shell very shallow and wide; cavity of the beaks very shallow and subangular; nacre very thin, bluish white and iridescent.

Remarks.—A single specimen only of this small, very much compressed and delicate species was received from Dr. Von dem Busch. The beaks are slightly eroded and may have possessed delicate undulations at the tip, but none are visible on this specimen, which in every other respect is perfect. Its green posterior slope, its yellow sides and fine striæ distinguish it from all other *Monocondylææ* with which I am acquainted. In outline it is nearest to *M. Cumingii*, (nobis), but it is a much smaller species, is much thinner, lighter, and is yellow while the other is brown. This specimen may not have obtained its full growth, but I doubt if it ever grows

very much larger. It belongs to the division which I made of *symphynote Unionidæ*, and this specimen is connate, having still part of the valves connected over the ligament.

MONOCONDYLÆA RHOMBOIDEA. Pl. 42, fig. 143.

Testâ lævi, rhombo-quadratâ, valdè compressâ, ad latere planulatâ, valdè inæquilaterali, posticè subalatâ, anticè obliquè truncatâ; valvulis tenuibus; natibus vix prominentibus, ad apices creberrimè et minutè undulatâ; epidermide olivaceâ, striatâ, nitidâ, obsoletè radiatâ; dentibus cardinalibus parvis, compresso-tuberculatis, in utroque valvulis singulis; margaritâ vel aureâ vel purpurecente et valdè iridescente.

Shell smooth, rhombo-quadrate, very much compressed, flattened at the side, very inequilateral, somewhat winged behind, obliquely truncate before; valves thin; beaks scarcely prominent, closely and minutely undulate at the tips; epidermis olive, striate, shining, obscurely rayed; cardinal teeth small, compressed-tubercular, single in each valve; nacre golden or purplish and very iridescent.

Monocondylæa rhomboidea, Lea. Proc. Acad. Nat. Sci. 1859, p. 187.

Hab.—Euphrates River, near Bagdad, Asia. G. Von dem Busch, M. D.

My cabinet and cabinet of Dr. Von dem Busch, Bremen.

Diam. .9,

Length 2.8,

Breadth 3.2 inches.

Shell smooth, rhombo-quadrate, very much compressed, flattened at the sides, very inequilateral, slightly winged behind, obliquely truncate before; substance of the shell thin; beaks scarcely prominent, closely and very minutely undulate near to the point of the tips; ligament rather long, somewhat thin and light brown; epidermis olive, striate, shining, obscurely rayed and with one or two very distant, broad marks of growth; umbonial slope very slightly raised and scarcely rounded; posterior slope exceedingly narrow, raised into a compressed keel, slightly darker than the rest of the disk, and with two rather indistinct rays on each valve from the beaks to the posterior margin; cardinal teeth small, compressed-tubercular, single in each valve; anterior cicatrices distinct, rather large and moderately impressed; posterior cicatrices confluent, very large and very slightly impressed; dorsal cicatrices in a row below the centre of the cavity of the beaks; cavity of the shell very shallow and very wide; cavity of the beaks exceedingly shallow and rounded; nacre golden or purplish, satin-like and iridescent.

Remarks.—This is a very remarkable species and may be considered as altogether a new type. Two opposing valves of different individuals of nearly the same size, were sent to me by Dr. Von dem Busch. The two differ slightly in the color of the epidermis, one being greenish olive with some rays, and the other brownish olive with very indistinct rays. The marks of growth differ in one having a single broad, brown mark, three-fourths of the distance from the beak to the basal margin, and the other

having two marks of growth, one at the margin and the other about half way. In the nacre the two differ, one being golden yellow and the other purplish, inclining to pale pink. The nacre is thicker and shows a band or thickening inside where the marks of growth exist outside. One of the valves is flatter on the middle and more suddenly compressed on the anterior portion than the others, and they are both slightly darker on this anterior portion. There is a disposition on the middle of both valves to be wrinkled; the impressed lines being very irregular. The undulations of the tips are very minute, irregular and very beautiful. This species can not be compared with any of the *Monocondylœa* I have seen. Its peculiar rhombic form places it in a division peculiar to itself.

UNIO BULLOIDES. Pl. 42, fig. 144.

Testâ sulcatâ, subrotundâ, valdè ventricosâ, subæquilaterali, posticè subalatâ, anticè rotundatâ; valvulis subtenuibus; natibus prominentibus, tumidis, ad apices radiis elevatis divaricatis; epidermide luteo-fuscâ, crebris transversis sulcis, eradiatâ; dentibus cardinalibus prælongis, lamellatis, valdè obliquis; lateralibus sublongis, lamellatis subrectisque; margaritâ albâ et iridescente.

Shell sulcate, rounded, very much inflated, nearly equilateral, somewhat winged behind, rounded before; valves rather thin; beaks rather prominent, swollen, with divergent raised rays at the tips; epidermis yellowish brown, with close transverse furrows, without rays; cardinal teeth very long, lamellar and very oblique; lateral teeth rather long, lamellar and nearly straight; nacre white and iridescent.

Unio bulloides, Lea. Proc. Acad. Nat. Sci., 1859, p. 187.

Hab.—Rio de la Plata, South America. G. Von dem Busch, M. D.

My cabinet and cabinet of Dr. Von dem Busch, Bremen.

Diam. 1·2,

Length 1·6,

Breadth 1·9 inch.

Shell sulcate, rounded, very much inflated, nearly equilateral, somewhat winged behind, rounded before; substance of the shell rather thin; beaks rather prominent, swollen, with numerous rather small, divergent raised rays at the tips; ligament short and rather thick; epidermis yellowish brown, with close transverse furrows, without rays, with indistinct, distant marks of growth; umbonial slope raised and rounded; posterior slope wide; cardinal teeth very long, lamellar, very oblique and single in the left and double in the right valve; lateral teeth rather long, lamellar and nearly straight; anterior cicatrices confluent, not very large and slightly impressed; posterior cicatrices confluent and very slightly impressed; dorsal cicatrices well impressed, in a row across the centre of the cavity of the beaks; cavity of the shell deep and rounded; cavity of the beaks rather deep and subangular; nacre white and iridescent.

Remarks.—A single specimen of this very much inflated species was sent to me by Dr. Von dem Busch. The epidermis is a good deal eroded towards the beaks, but there seems not to have been any rays. The marks of growth are indistinct and somewhat

distant. In this specimen there are some wrinkles on the posterior slope, but this may not be a permanent character. The lateral teeth are remarkable for their length and for being *single* in the *left* and *double* in the *right* valve. It has the character of costæ or raised rays diverging from the tip of the beaks, which is so general with the species of South America, and which has not yet been observed in any North American, nor in any European, African or Asiatic species. In outline it is nearest to *U. Paranensis*, (nobis), but cannot be confounded with that species, being thinner in the substance of the valves, being much more inflated and in having a higher wing and broader posterior slope. It is nearer in outline to *Diplodon* (*Unio*) *rotundum*, Spix, than any other described in his fluviatile shells of Brazil, but it is quite different in the teeth, and in being more rounded and more ventricose.

UNIO CALDWELLII. Pl. 43, fig. 145.

Testâ sulcatâ, ellipticâ, subinflatâ, posticè obtusè angulatâ, inæquilaterali; valvulis subcrassis; natibus subelevatis, ad apices minutè undulatis; epidermide luteo-fuscâ eradiatâque; dentibus cardinalibus compressis, elevatis crenulatisque; lateralibus sublongis subrectisque; margaritâ salmonis colore tinctâ et iridescente.

Shell sulcate, elliptical, somewhat inflated, obtusely angular behind, inequilateral; valves rather thick; beaks rather raised and minutely undulate at the tips; epidermis yellowish brown and without rays; cardinal teeth compressed, elevated and crenulate; lateral teeth rather long and nearly straight; nacre salmon color and iridescent.

Unio Caldwellii, Lea. Proc. Acad. Nat. Sci., 1858, p. 118.

Hab.—Isthmus of Darien. H. C. Caldwell, M. D., U. S. Navy.

My cabinet.

Diam. .8,

Length 1.5,

Breadth 2.3 inches.

Shell sulcate, elliptical, somewhat inflated, obtusely angular behind and rounded before, inequilateral; substance of the shell rather thick; beaks rather raised and minutely undulate at the tips; ligament rather short, somewhat thick and light brown; epidermis yellowish brown, with distant marks of growth and without rays; umbonal slope slightly raised and rounded; posterior slope rather narrow, with an impressed line from the beaks to the posterior margin; cardinal teeth rather large, compressed, elevated and crenulate; lateral teeth rather long, nearly straight and terminating in an arched plate; anterior cicatrices distinct and well impressed; posterior cicatrices confluent and moderately impressed; dorsal cicatrices situated above the centre of the cavity of the beaks; cavity of the shell moderately deep and wide; cavity of the beaks rather deep and subangular; nacre salmon color and iridescent.

Remarks.—A single specimen was brought by Dr. Caldwell from his perilous expedition on the Isthmus of Darien with Lieut. Strain, and these molluscs formed part of the food on which the party subsisted. It is somewhat like *aratus*, (nobis), but is much

larger and not so transverse. In outline it is near to *corrugatus*, Lam., but being a sulcate species cannot be for a moment confounded with it. The furrows are close and well impressed on the anterior and but slightly on the posterior portion. They diminish in size towards the beaks, where they are fine and close, but cease where three or four small undulations exist at the tips. It is greatly to be regretted that we have not the soft parts and more specimens to make a more perfect diagnosis of this interesting little species. I owe this specimen to the kindness of Dr. Ruschenberger.

UNIO RUDUS. Pl. 43, fig. 146.

Testâ lævi, ellipticâ, crassâ, inflatâ, inæquilaterali, posticè emarginatâ, anticè obliquè rotundatâ; valvulis valdè crassis, anticè crassioribus; natibus crassis prominentibusque; epidermide tenebroso-fuscâ, asperè striatâ, radiis incisis; dentibus cardinalibus parviusculis, sublongis, striatis, crenulatis, in utroque valvulo duplicibus; lateralibus sublongis, subcrassis, granulatis curvisque; margaritâ albâ et paulisper iridescente.

Shell smooth, elliptical, thick, inflated, inequilateral, emarginate behind and obliquely rounded before; valves very thick, thicker before; beaks thick and prominent; epidermis dark brown, roughly striate, with indented rays; cardinal teeth rather small, somewhat elongate, striate, crenulate and double in both valves; lateral teeth somewhat long, rather thick, granulate and curved; nacre white and slightly iridescent.

Unio rudus, Lea. Proc. Acad. Nat. Sci., 1859, p. 187.

Hab.—Rio de la Plata, South America. G. Von dem Busch, M. D.

My cabinet and cabinet of Dr. Von dem Busch, Bremen.

Diam. 1·4,

Length 2·2,

Breadth 3 inches.

Shell smooth, elliptical, thick, inflated, inequilateral, emarginate behind, obliquely rounded before; substance of the shell thick and ponderous, thicker before; beaks thick and prominent; ligament rather short, thick and light brown; epidermis dark brown, lighter towards the beaks, roughly striate, the marks of growth being rather close and irregularly impressed into furrows, which are crossed by a few indistinct impressed furrows from the beaks to the margin; umbonial slope raised and rounded; posterior slope broad, rather flat, with a low keel rising from a deep broad furrow; cardinal teeth rather small, somewhat elongate, striate, crenulate and double in both valves; lateral teeth somewhat long, rather thick, granulate, thickened towards the end and curved; anterior cicatrices distinct, large and deeply impressed; posterior cicatrices confluent, rather large and well impressed; dorsal cicatrices well impressed and placed in a row across the centre of the cavity of the beaks; pallial cicatrix irregular and deeply impressed; cavity of the shell deep and rounded; cavity of the beaks rather deep and subangular; nacre white, disposed to be pinkish at the anterior basal margin and iridescent.

Remarks.—There was a single specimen only of this species sent to me by Dr.

Von dem Busch. It is much stouter than *Uniones* are usually from South America, and is perhaps more nearly allied to *Wheatleyanus*, (nobis), from the Rio Negro than any other species. It approaches to *delodontus*, Lam., but is thicker and more rotund than that species. It may be distinguished at once from *Wheatleyanus* by its greater thickness, by the swollen beaks, the furrow on the posterior slope and the size and form of the cardinal teeth, which are peculiar in this. The beaks of this specimen being much eroded it is impossible to say what may be the character of the tips, but they are likely to have rayed ribs, like most South American *Unionidæ*, but not so much so as in *Wheatleyanus*. The specimen before me, as described above, is rugose, with a few irregular transverse and radiating furrows, which may not exist on all specimens. It is dark brown and roughly striate near the margin, and smoother and light brown towards the beaks.

ANODONTA LUTEOLA. Pl. 43, fig. 147.

Testâ lævi, obovatâ, subcompressâ, posticè et anticè rotundatâ, inæquilaterali; valvulis subtenuibus; natibus prominulis; epidermide luteo-olivâ, transversim striatâ; margaritâ albâ et valdè iridescente.

Shell smooth, obovate, rather compressed, rounded behind and before, inequilateral; valves rather thin; beaks a little prominent; epidermis yellowish olive, transversely striate; nacre white and very iridescent.

Anodonta luteola, Lea. Proc. Acad. Nat. Sci., 1858, p. 118.

Hab.—Isthmus of Darien. H. C. Caldwell, M. D., U. S. Navy.

My cabinet.

Diam. .6,

Length 1.1,

Breadth 1.7 inch.

Shell smooth, obovate, rather compressed, rounded behind and before, inequilateral, with a slightly curved dorsal line; substance of the shell rather thin, beaks a little prominent; ligament rather long, thin and light brown; epidermis yellowish olive, transversely striate, very much wrinkled and with distant marks of growth; umbonial slope very slightly raised and rounded; posterior slope narrow, raised into a high carina, with a greenish line from each of the beaks to the posterior margin; anterior cicatrices confluent and slightly impressed; posterior cicatrices confluent and very slightly impressed; dorsal cicatrices above the centre of the cavity of the beaks; cavity of the shell moderately deep and rounded; cavity of the beaks shallow and rounded; nacre white and very iridescent.

Remarks.—A single specimen was brought by Dr. Caldwell. It is somewhat like *Trautwiniana*, (nobis), but that shell is more oval, darker and greenish in the epidermis. I have had an eroded specimen of *luteola* in my cabinet for many years, bought in Paris and said to have come from Martinique. It was labelled *obtusa*, Spix, but it is not, certainly, that species. I do not believe that any species of the family inhabits the island of Martinique. I know of only one species in the West India Islands—the *Scamnatus*, Morelet, which is not uncommon in Cuba, as I have stated elsewhere.

By the examination of Spix's description and figure it will be seen at once that our species differs in many points from his *obtusa*, tab. 22, fig. 3 and 4. It is more compressed, is without rays and has a striate and wrinkled surface. In the two specimens before me the beaks are eroded and therefore no character can be given of them. Both have a rather broad margin, and the *triangular* fosset at the end of the ligament which is so characteristic of the South American and Central American species. This specimen was kindly given to me by Dr. Ruschenberger.

UNIO CANADENSIS. Pl. 44, fig. 148.

Testâ lævi, triangulari, subcompressâ, inæquilaterali, posticè obtusè angulatâ; valvulis subcrassis, anticè crassioribus; natibus subprominentibus; epidermide luteâ, posticè radiatâ; dentibus cardinalibus parvis, erectis crenulatisque; lateralibus longis, curvis lamellatisque; margaritâ vel albâ vel roseâ et iridescente.

Shell smooth, triangular, rather compressed, inequilateral, obtusely angular behind; valves rather thick, thicker before; beaks rather prominent; epidermis yellowish, radiated behind; cardinal teeth small, erect and crenulate; lateral teeth long, curved and lamellar; nacre white or pinkish and iridescent.

Unio Canadensis, Lea. Proc. Acad. Nat. Sci., 1857, p. 85.

Hab.—St. Lawrence River, near Montreal. M. Carey Lea.

My cabinet and cabinet of the Academy of Natural Sciences, Philadelphia.

Diam. 1·3, Length 2·1, Breadth 3·3 inches.

Shell smooth, triangular, rather compressed, inflated towards the beaks, inequilateral, obtusely angular behind, obliquely rounded before; substance of the shell rather thick, thicker before; beaks rather prominent; ligament rather long and thick; epidermis yellowish, radiated behind, and with distant marks of growth; umbonial slope raised and somewhat angular; posterior slope rather wide and raised into a carina; cardinal teeth small, erect and crenulate, single in the right and double in the left valve; lateral teeth long, curved and lamellar; anterior cicatrices distinct and deeply impressed; posterior cicatrices confluent and slightly impressed; dorsal cicatrices situated on the plate within the cavity of the beaks and posterior to the cardinal tooth; cavity of the shell deep and wide; cavity of the beaks deep and angular; nacre white or pinkish and iridescent.

Remarks.—This species is closely allied to *ovatus*, Say, but it is smaller and more compressed, and the posterior slope is not so much flattened. The specimen before me has pinkish teeth. There are no rays on the sides of it, but the posterior slope is nearly covered with green rays and other individuals may be found with rays on the sides. The beaks are too much eroded to distinguish the character of the undulations. There are two specimens in the Academy of Natural Sciences, both of which are rather smaller than the one figured here.

UNIO AVERYI. Pl. 44, fig. 149.

Testâ sulcatâ, subtriangulari, subventricosâ, inæquilaterali, posticè obtusè angulatâ, anticè subrotundatâ; valvulis crassis, anticè crassioribus; natibus subprominentibus; epidermide rufo-fuscâ, eradiatâ; dentibus cardinalibus subcrassis, suberectis, valdè crenulatis; lateralibus crassis, suberectisque; margaritâ albâ et iridescente.

Shell sulcate, subtriangular, rather ventricose, inequilateral, obtusely angular behind, rounded before; valves thick, thicker before; beaks rather prominent; epidermis reddish brown, without rays; cardinal teeth rather thick, nearly erect, very crenulate; lateral teeth thick, and nearly straight; nacre white and iridescent.

Unio Averyi, Lea. Proc. Acad. Nat. Sci., 1859, p. 281.

Hab.—Chumnagua River, Isthmus of Darien. Mr. Frederick Avery, per J. G. Cooper, M. D.

My cabinet and cabinet of William Cooper, Esq., Hoboken, N. J.

Diam. 1·2, Length 1·6, Breadth 2·3 inches.

Shell sulcate, subtriangular, very ventricose, inequilateral, obtusely angular behind, rounded before; substance of the shell thick, very much thicker before; beaks rather prominent; ligament thick and rather short; epidermis reddish brown, rather rough, without rays and with rather distant, indistinct marks of growth; umbonial slope rounded; posterior slope rather wide; cardinal teeth rather thick, nearly erect, very crenulate single in the right and double in the left valve; lateral teeth thick, nearly straight, rather short and obtuse at the posterior end; anterior cicatrices distinct and very deeply impressed; posterior cicatrices distinct and well impressed; dorsal cicatrices well impressed and placed under the plate behind the cardinal teeth; cavity of the shell rather deep and rounded; cavity of the beaks shallow and rounded; nacre white and iridescent.

Remarks.—There were two specimens only of this species sent to me by J. G. Cooper, M. D., who informs me that they were brought by Mr. Avery from that ill-fated expedition across the Isthmus of Darien under Lieut. Strain, and were “the *Clams* on which they partly subsisted on their journey across the Isthmus.” This species in outline is somewhat approaching to *Unio cyrenoides*, Phil.,* from Lake Nicaragua, but it is not so thick, nor is it so triangular as that species, nor so high in the beaks. The figure of Dr. Philippi represents the exterior as sulcate, but he does not give that character in his diagnosis. Our species is but slightly sulcate, and one specimen is more so than the other. In both the erosion of the beaks and sides is so great as almost to debar a correct idea of its exterior. The character of the undulations of the tips, if there be any there, of course cannot be yet determined. There are few of the species indigenous to this country to which it can be compared. It is per-

* Conchylien, vol. 3, pl. 5, fig. 1.

Remarks.—A single specimen only was received by Mr. Wheatley, the beaks of which are much eroded and therefore the character of them cannot be described, but from the nature of the small folds which remain on the non-eroded part of the posterior slope, I suspect that in perfect specimens the tips would be found to be finely undulate. The cardinal teeth are rather of an unusual form, that in the right valve having the upper portion long and lamellar, the lower lobe diverging from the middle in a curve, and it is here thickened. The thickening of the anterior portion of the valves is unusual. In this specimen it embraces only the anterior third of them. Usually where this thickening exists it embraces one-half or two-thirds of the valve. This thickening is also very abrupt in the cavity of the shell. The umbonial slope shows

distinctly the disposition to biangularity of the posterior portion of the valves, and here the marks of growth shew some greenness, which is no where else observable. In more perfect specimens some of these characters may be found to be very different. It is to be regretted that there should be only a single one, and that very imperfect in the beaks and some parts of the epidermis.

In outline this species is near to *favidens*, Ben., but it is not so obliquely triangular. It may easily be distinguished by its lighter colored epidermis, and by its having a much thinner substance of the valves, the ponderosity being very different, as well also by the cardinal and lateral teeth being very much thinner and less crenulate. In outline it has some resemblance to some of the oblique varieties of *obliquus*, Lam., but the cardinal teeth are totally different in character.

UNIO WYNEGUNGAENSIS. Pl. 45, fig. 151.

Testâ lævi, ellipticâ, inflatâ, inæquilaterali, posticè subbiangulatâ, anticè obliquè rotundatâ; valvulis subcrassis, anticè crassioribus; natibus prominentibus, ad apices valdè divaricatè undulatis; epidermide luteo-olivâ, micante, obsoletè radiatâ; dentibus cardinalibus subcrassis, suberectis, valdè crenulatis, in utroque valvulo duplicibus; lateralibus sublongis, crassis suberectisque; margaritâ salmonis colore paulisper tinctâ et iridescente.

Shell smooth, elliptical, inflated, inequilateral, somewhat biangular behind, obliquely rounded before; valves rather thick, thicker before; beaks prominent, very undulate and divaricate at the tips; epidermis yellowish olive, shining, and absolutely rayed; cardinal teeth rather thick, somewhat erect, very much crenulate and double in both valves; lateral teeth rather long, thick and nearly straight; nacre light salmon color and iridescent.

Unio Wynequngaensis, Lea. Proc. Acad. Nat. Sci., 1859, p. 331.

Hab.—Wynegunga River, thirty miles east of Nagpoor, in the Deccan, Bengal.
C. M. Wheatley.

My cabinet and cabinet of Mr. Wheatley.

Diam. 1, Length 1·5, Breadth 2·4 inches.

Shell smooth, elliptical, inflated, inequilateral, somewhat biangular behind and obliquely rounded before; substance of the shell rather thick, thicker before; beaks prominent, very much undulated, with divaricate and zigzag undulations at the tips; ligament rather long and thick; epidermis yellowish olive, shining, obscurely rayed, with distant marks of growth and disposed to be transversely banded; umbonial slope raised and rounded; posterior slope rather depressed, rather wide, with a dark line from the beaks to the posterior margin in each valve and traversing a number of small oblique folds; cardinal teeth rather thick, somewhat erect, very much crenulate and double in both valves; lateral teeth rather long, thick and nearly straight; anterior cicatrices distinct and very deeply impressed; posterior cicatrices distinct and very slightly impressed; dorsal cicatrices placed on the under side of the plate

above the cavity of the beaks; cavity of the shell rather deep and somewhat wide; cavity of the beaks rather deep and angular; nacre light salmon color and iridescent.

Remarks.—This species in outline is very near to *Unio Burroughianus*, (nobis), from Rio Parana, but differs in the color of the epidermis, being yellowish olive and not dark bottle green; both have radiating folds on the beaks, but those of *Burroughianus* are larger, fewer and not so long. They differ in the cardinal teeth, the South American species being compressed and oblique, and the nacre being silver white without any tint of salmon color. In outline it differs from *Wheatleyanus*, (nobis), in being more oblique, in not having a carina, in having smaller folds on the beaks, in having a white nacre, and in the teeth not being so oblique or compressed. In the color of the epidermis they are both very much alike. In the *Wynegungaensis* the beaks are furnished with numerous, beautiful folds directed towards the basal margin, the central ones having a zigzag inflection with acute angles.

UNIO CONSOBRINUS. Pl. 45, fig. 152.

Testâ lævi, ellipticâ, subinflatâ, inæquilaterali, posticè obtusè angulatâ, anticè rotundatâ; valvulis subtenuibus, anticè paulisper crassiusculis; natibus prominulis; epidermide micante, tenebroso-fuscâ, eradiatâ; dentibus cardinalibus parvis, crenulatis, compressis, obliquis, in valvulam dextram duplicibus; lateralibus longis, lamellatis subcurvisque; margaritâ salmonis colore tinctâ et valdè iridescente.

Shell smooth, elliptical, somewhat inflated, inequilateral, obtusely angular behind, rounded before; valves rather thin, a little thickened before; beaks a little prominent; epidermis shining, dark brown, without rays; cardinal teeth small, crenulate, compressed, double in the right valve; lateral teeth long, lamellar and somewhat curved; nacre salmon colored and very iridescent.

Unio consobrinus, Lea. Proc. Acad. Nat. Sci., 1859, p. 331.

Hab.—China. C. M. Wheatley.

My cabinet and cabinet of Mr. Wheatley.

Diam. .9,

Length 1.3,

Breadth 2.4 inches.

Shell smooth, elliptical, somewhat inflated, inequilateral, obtusely angular behind and rounded before; substance of the shell rather thin, slightly thickened before; beaks a little prominent; ligament rather long, thin and light brown; epidermis shining, minutely striate, without rays, dark brown, except at the beaks and at the basal margin where there is a broad border of light brown; umbonial slope somewhat raised and rounded; posterior slope slightly raised, rather broad, with two indistinct lines from the beaks to the posterior margin in both valves; cardinal teeth small, crenulate, compressed, *double* in the *right* valve and *single* in the *left*; lateral teeth long, lamellar and somewhat curved, double in the left and single in the right valve; anterior cicatrices distinct and moderately impressed; posterior cicatrices confluent and very slightly impressed; dorsal cicatrices in a row across the centre of the cavity of

the beaks; cavity of the shell rather deep and wide; cavity of the beaks very small and rounded; nacre salmon colored and very iridescent.

Remarks.—This species belongs to the group of which *marginalis*, Lam., may be considered the type, and to which *Layardii*, (nobis), and *lamellatis*, (nobis), belong, a marked character of which is to have a lighter band of color, somewhat yellowish towards the margin, while the remainder of the epidermis is more or less brown. *Consobrinus* is, in outline, between *Layardii* and *lamellatis*. It is a little stouter than either and has thicker teeth, and the cardinal teeth are shorter and not so lamellar as either of the others. The nacre also is in the specimens before me salmon color, while that in neither of the others is so, they being white. Like both it has the double tooth in the right valve, but in all of them there is a slight disposition to duplication in the left. Owing to the want of perfect beaks, I am unable to say if there be any undulations at the tips, but I suspect that very minute ones will be found in perfect specimens.

1. The first part of the paper is devoted to a general discussion of the problem of the existence of solutions of the system of equations

$$\frac{dx}{dt} = f(x, y, z), \quad \frac{dy}{dt} = g(x, y, z), \quad \frac{dz}{dt} = h(x, y, z),$$

where f, g, h are continuous functions of x, y, z and satisfy the Lipschitz condition.

2. In the second part we consider the case when the functions f, g, h are linear in x, y, z and the system of equations can be written in the form

$$\frac{dx}{dt} = A_1 x + A_2 y + A_3 z, \quad \frac{dy}{dt} = B_1 x + B_2 y + B_3 z, \quad \frac{dz}{dt} = C_1 x + C_2 y + C_3 z,$$

where A_i, B_i, C_i are constants. In this case the system of equations can be solved by the method of variation of constants.

3. In the third part we consider the case when the functions f, g, h are quadratic in x, y, z and the system of equations can be written in the form

$$\frac{dx}{dt} = A_1 x + A_2 y + A_3 z + A_4 x^2 + A_5 xy + A_6 xz + A_7 y^2 + A_8 yz + A_9 z^2,$$

where A_i are constants. In this case the system of equations can be solved by the method of variation of constants.

4. In the fourth part we consider the case when the functions f, g, h are cubic in x, y, z and the system of equations can be written in the form

$$\frac{dx}{dt} = A_1 x + A_2 y + A_3 z + A_4 x^3 + A_5 x^2 y + A_6 x^2 z + A_7 x y^2 + A_8 x y z + A_9 x z^2 + A_{10} y^3 + A_{11} y^2 z + A_{12} y z^2 + A_{13} z^3,$$

where A_i are constants. In this case the system of equations can be solved by the method of variation of constants.

5. In the fifth part we consider the case when the functions f, g, h are of higher order than cubic in x, y, z and the system of equations can be written in the form

$$\frac{dx}{dt} = A_1 x + A_2 y + A_3 z + A_4 x^4 + A_5 x^3 y + A_6 x^3 z + A_7 x^2 y^2 + A_8 x^2 y z + A_9 x^2 z^2 + A_{10} x y^3 + A_{11} x y^2 z + A_{12} x y z^2 + A_{13} x z^3 + A_{14} y^4 + A_{15} y^3 z + A_{16} y^2 z^2 + A_{17} y z^3 + A_{18} z^4,$$

where A_i are constants. In this case the system of equations can be solved by the method of variation of constants.

6. In the sixth part we consider the case when the functions f, g, h are of higher order than cubic in x, y, z and the system of equations can be written in the form

$$\frac{dx}{dt} = A_1 x + A_2 y + A_3 z + A_4 x^5 + A_5 x^4 y + A_6 x^4 z + A_7 x^3 y^2 + A_8 x^3 y z + A_9 x^3 z^2 + A_{10} x^2 y^3 + A_{11} x^2 y^2 z + A_{12} x^2 y z^2 + A_{13} x^2 z^3 + A_{14} x y^4 + A_{15} x y^3 z + A_{16} x y^2 z^2 + A_{17} x y z^3 + A_{18} x z^4 + A_{19} y^5 + A_{20} y^4 z + A_{21} y^3 z^2 + A_{22} y^2 z^3 + A_{23} y z^4 + A_{24} z^5,$$

where A_i are constants. In this case the system of equations can be solved by the method of variation of constants.

7. In the seventh part we consider the case when the functions f, g, h are of higher order than cubic in x, y, z and the system of equations can be written in the form

$$\frac{dx}{dt} = A_1 x + A_2 y + A_3 z + A_4 x^6 + A_5 x^5 y + A_6 x^5 z + A_7 x^4 y^2 + A_8 x^4 y z + A_9 x^4 z^2 + A_{10} x^3 y^3 + A_{11} x^3 y^2 z + A_{12} x^3 y z^2 + A_{13} x^3 z^3 + A_{14} x^2 y^4 + A_{15} x^2 y^3 z + A_{16} x^2 y^2 z^2 + A_{17} x^2 y z^3 + A_{18} x^2 z^4 + A_{19} x y^5 + A_{20} x y^4 z + A_{21} x y^3 z^2 + A_{22} x y^2 z^3 + A_{23} x y z^4 + A_{24} x z^5 + A_{25} y^6 + A_{26} y^5 z + A_{27} y^4 z^2 + A_{28} y^3 z^3 + A_{29} y^2 z^4 + A_{30} y z^5 + A_{31} z^6,$$

where A_i are constants. In this case the system of equations can be solved by the method of variation of constants.

8. In the eighth part we consider the case when the functions f, g, h are of higher order than cubic in x, y, z and the system of equations can be written in the form

$$\frac{dx}{dt} = A_1 x + A_2 y + A_3 z + A_4 x^7 + A_5 x^6 y + A_6 x^6 z + A_7 x^5 y^2 + A_8 x^5 y z + A_9 x^5 z^2 + A_{10} x^4 y^3 + A_{11} x^4 y^2 z + A_{12} x^4 y z^2 + A_{13} x^4 z^3 + A_{14} x^3 y^4 + A_{15} x^3 y^3 z + A_{16} x^3 y^2 z^2 + A_{17} x^3 y z^3 + A_{18} x^3 z^4 + A_{19} x^2 y^5 + A_{20} x^2 y^4 z + A_{21} x^2 y^3 z^2 + A_{22} x^2 y^2 z^3 + A_{23} x^2 y z^4 + A_{24} x^2 z^5 + A_{25} x y^6 + A_{26} x y^5 z + A_{27} x y^4 z^2 + A_{28} x y^3 z^3 + A_{29} x y^2 z^4 + A_{30} x y z^5 + A_{31} x z^6 + A_{32} y^7 + A_{33} y^6 z + A_{34} y^5 z^2 + A_{35} y^4 z^3 + A_{36} y^3 z^4 + A_{37} y^2 z^5 + A_{38} y z^6 + A_{39} z^7,$$

VIII.—*Descriptions of New Species of Cretaceous and Eocene Fossils of Mississippi and Alabama.*

BY T. A. CONRAD.

A series of Cretaceous fossils from Barbour Co., Alabama, collected by the late Mr. Tuomey, Geologist of that State, has been referred to me for examination. There are several species which appear to be unpublished and are herein described, together with others from Tippah Co., Mississippi, collected by Dr. Spillman, and which are evidently synchronous with those from Eufaula, Alabama. I had at first supposed this remarkable group of fossils to be of more recent origin than those of New Jersey and Green County, Alabama, but I now find so many species common to the New Jersey and Mississippi strata, that any great difference in age is not indicated by organic remains. Dr. Hilgard, State Geologist of Mississippi, has named the Tippah strata Upper Cretaceous, and no doubt his future researches will enable him to define with accuracy their stratigraphical relation to the limestone of the central counties. The North Mississippi inferior beds possess a mineral character precisely like that of the Eufaula deposit, and many of the shells are common to both. This marl or dark gray friable matrix has fortunately preserved the shells very perfectly and enabled us to identify some of the species with the neglected and obscure casts common in New Jersey. With the assistance of a young Palæontologist, William M. Gabb, I have compared the shells and casts, and the result is given in the following list.

Species common to the upper and lower Cretaceous Beds.

1. <i>Pholadomya occidentalis</i> , <i>Morton</i> ,	Tippah,	New Jersey.
2. <i>Dosinia excavata</i> (<i>Cytherea</i>), <i>ib.</i> ,	"	"
3. <i>Fragilia elegantula</i> (<i>Cardium</i>), <i>Roemer</i> ,	"	" Texas.
<i>F. protexta</i> , <i>Conrad</i> .		
4. <i>Cardium Spillmani</i> , <i>Conrad</i> ,	"	"
5. <i>Trigonia thoracica</i> , <i>Morton</i> ,	"	"
6. <i>Pycnodonta vesicularis</i> (<i>Gryphæa</i>), <i>Lam.</i> ,	"	"
7. <i>Gervillia ensiformis</i> , <i>Con.</i> ,	"	"
8. <i>Exogyra costata</i> , <i>Say</i> ,	"	"
9. <i>Pinna bicarinata</i> , <i>Matheron</i> ,	Eufaula,	"
<i>P. laqueata</i> , <i>Conrad</i> ,		

10. <i>Axinæa</i> (<i>Pectunculis</i>) <i>australis</i> , <i>Morton</i> ,	Tippah,	New Jersey,
11. <i>Meretrix</i> <i>Tippiana</i> , <i>Conrad</i> ,	"	"
12. <i>Ctenoides</i> <i>pelagica</i> (<i>Lima</i>), <i>Morton</i> ,	"	"
13. <i>Crassatella</i> <i>vadosa</i> , <i>Morton</i> ,	Eufaula,	"
14. <i>C. linæa</i> , <i>Con.</i> ,	"	"
15. <i>Barbatia</i> <i>uniopsis</i> , <i>Con.</i> ,	"	"
16. <i>Pecten</i> <i>Burlingtonensis</i> ? <i>Gabb</i> ,	"	"
17. <i>Anomia</i> <i>argentaria</i> , <i>Morton</i> ,	"	"
18. <i>Turritella</i> <i>vertebroides</i> , <i>Morton</i> ,	"	"
19. <i>Ficus</i> <i>octoratus</i> , <i>Con.</i> ,	"	"
20. <i>Turbinopsis</i> <i>Hilgardi</i> , <i>Con.</i> ,	"	"
21. <i>Nautilus</i> <i>Dekayi</i> , <i>Morton</i> ,	"	"
22. <i>Baculites</i> <i>carinatus</i> , <i>Morton</i> ,	"	"
<i>B. Spillmani</i> , <i>Con.</i> ,		
23. <i>Solenoceros</i> <i>annulifer</i> ,	"	"
<i>Hamites</i> <i>annulifer</i> , <i>Morton</i> ,		
24. <i>Vermetus</i> (<i>Hamulus</i>) <i>onyx</i> , <i>Morton</i> ,	"	"

PERIPLOMA, *Schum.*

PERIPLOMA APPLICATA. Pl. 46, fig. 1, Jour. Acad. (New Ser.) vol. 3, p. 324.

PHOLADOMYA, *Sowerby.*

PHOLADOMYA ANTERADIATA. Pl. 46, fig. 3. Oblong, straight, convex-depressed, subequilateral; anterior hinge line very slightly oblique; anterior extremity subtruncated and on a line with the umbo; posterior margin regularly rounded; posterior side deeply sulcated concentrically; anterior side with distant, acute, prominent lines, seven or eight in number.

Locality.—Tippah Co., Miss. Dr. Spillman.

PHOLADOMYA POSTSULCATA. A fragment allied to the preceding species, but with closely arranged radii anteriorly; larger than the preceding.

Locality.—Tippah Co., Miss. Dr. Spillman.

PHOLADOMYA PAPYRIA. Very thin, concentrically striated, and deeply sulcated on the posterior side; anteriorly radiated with a few prominent lines, the two most distant from anterior end remote.

Locality.—Tippah Co. Dr. Spillman.

A fragment of a young or small species, very distinct from *P. anteradiata*.

These three species have an elongated form not unlike that of *ANATINA*, to which genus a species has been referred in the Quarterly Jour. Geol. Soc., 1858, (*A. versicostata*.) All these shells are characterized by concentric furrows posteriorly and by radiating lines. I propose to arrange them in a subgenus, under the name of *ANATIMYA*.

PHOLADOMYA OCCIDENTALIS, *Morton*. Subovate, very inequilateral, inflated an-

teriorly; ribs about 25, irregular, prominent, acute, posteriorly distant, crenulated by rugose concentric striæ, on the umbo tuberculato-crenate; summit very prominent; anterior margin obliquely truncated. Length $3\frac{1}{4}$ inches, height $2\frac{1}{4}$ inches.

Locality.—With the preceding. Dr. Spillman.

Morton's description is from the cast, mine from the shell.

LEGUMEN, *Conrad*.

The genus LEGUMEN is founded on shells closely related to CULTELLUS, *Schumacher*. Having examined specimens of the hinge in both valves, the following description will indicate the genus. Oblong, much compressed, slightly gaping; hinge of right valve with two direct lamelliform teeth under the apex, and one oblique, elongated, lamelliform, bifid tooth almost parallel with the inner cardinal margin; left valve with one direct, elevated, compressed tooth, with a pit on each side, the posterior one widest; two very oblique, lamelliform teeth diverge in a posterior direction from the apex; cardinal plate broad opposite the apex, anteriorly broad and channelled.

LEGUMEN PLANULATUS (SOLEMYA,) *Conrad*. Journ. Acad. Nat. Sci., Vol. 2, (New Series,) p. 274, pl. 24, fig. 11.

This species has been found only in the state of casts, and is much shorter proportionally than the preceding species, exhibiting also an impression of a rib-like callus near the hinge, which callus is wanting in the others. It has not been found associated with the Tippah and Eufaula fossils, but occurs in the limestone of Alabama and green sand of New Jersey.

SANGUINOLARIA, *Lam*.

SANGUINOLARIA CRETACENSIS. Pl. 46, fig. 11. Ovate, compressed; cardinal plate broad, the inferior margin of the posterior cardinal plate salient and acutely angulated.

Locality.—Tippah Co., Mississippi.

The only specimen is a valve in marl showing the interior. The cardinal teeth are broken off, otherwise the valve is in excellent preservation.

TELLINA, *Lin*.

TELLINA EUFAULENSIS. Subtriangular, convex, entire, inequilateral; anterior end subtruncated; hinge margins equally declining; summit not prominent; posterior end acutely rounded; left valve furnished with one bifid and one rudimentary cardinal tooth; lateral teeth distinct.

Locality.—Eufaula, Alabama. Tuomey's collection.

Subgenus *TELLINIMERA*, Conrad.

T. (TELLINIMERA) LIMATULA. Pl. 46, fig. 10. Thin, polished, rather elongated; right valve with three cardinal teeth, the shortest one extending to the apex. No lateral tooth; posterior cardinal plate obliquely salient, acute.

The hinge of the right valve only has been observed.

T. (TELLINIMERA) EBOREA. Pl. 46, fig. 14. Equilateral, subtriangular, compressed; reflexed posteriorly, end subangulated; anterior end rounded; disc with concentric, regular, slightly impressed lines; substance very thin; anterior cardinal tooth slightly oblique, the posterior one very oblique.

Locality.—Alabama. Mr. Tuomey's collection.

DOSINIA, *Scopoli*.

DOSINIA DEPRESSA. Pl. 46, fig. 6. Longitudinally suboval, convex-depressed, inequilateral; dorsal margin somewhat arcuated, subangular at the posterior extremity; umbo flattened; beak not prominent; disk smooth or with a few distant furrows; umbo minutely and elegantly striated concentrically; length considerably more than the height.

Locality.—Eufaula, Alabama. Tuomey's collection.

A young specimen, very thin and flattened, shows a somewhat greater proportional length than the adult, and the concentric lines are only visible near the apex. In the former they extend over about one-fourth of the disk.

DOSINIA OBLIQUATA. Pl. 46, fig. 2. Lentiform, very oblique; beaks almost terminal; minute, concentric, regular, closely arranged, impressed lines on the anterior side.

Locality.—Tippah Co., Mississippi. Dr. Spillman.

MYSIA, *Leach*.

MYSIA PARILIS. Pl. 46, fig. 8. Shell suborbicular, equilateral, ventricose, direct; surface entire; hinge with the anterior cardinal channel very profound.

Locality.—Tippah Co., Mississippi. Dr. Spillman.

CARDIUM.Subgenus *PROTOCARDIA*.

C. (PROTOCARDIA) LINTEUM. Pl. 46, fig. 17. Triangular, slightly ventricose, subequilateral; suddenly contracted before the umbonal slope, which is defined by a carinated line; posterior extremity truncated and slightly oblique; basal margin rounded; disk covered with minute, closely arranged, regular lines, terminating at the raised line on the umbo.

Locality.—Eufaula. Mr. Tuomey's collection. Tippah Co., Alabama. Dr. Spillman.

CRASSATELLA, Lam.

CRASSATELLA LINTEA. Pl. 46, fig. 5. Subovate or subtriangular, convex, inequilateral; disk concentrically ridged and finally striated, slightly contracted near the umbonal slope, which is rounded; posterior extremity subtruncated; apex slightly prominent; posterior dorsal line nearly straight, very oblique; margin within finely crenulated; lunule long and lanceolate.

Locality.—Alabama. Tuomey's collection.

Accompanies *C. vadosa*, and nearly related to it, but numerous specimens of each compared showed a specific difference. It is thinner, less cuneiform posteriorly, and differs in the fine raised concentric lines, &c.

CRASSATELLA PTEROPSIS. Pl. 46, fig. 9. Aliform, very inequilateral, convex anteriorly, posteriorly contracted; umbonal slope slightly carinated below the umbo; posterior side rostrated; surface with minute, concentric, impressed lines, very fine and closely arranged on the umbo and summit; margin within finely crenulated.

Locality.—Tippah Co., Mississippi. Dr. Spillman.

This species has nearly the outline of *C. aliformis*, Conrad, an Eocene shell, but it is rather more nearly cuneiform posteriorly, and can be distinguished at a glance by the minute grooves or lines on the umbo, which are large in the former species.

LINEARIA, Conrad.

Oval or oblong; cardinal teeth in the left valve two, the anterior one elongated, very oblique, the other under the apex small and bifid.

This shell, of which I have only the right valve, belongs to a Cretaceous group, which D'Orbigny has referred to the genus ARCOPAGIA of Brown; but they appear to me widely different, and certainly the hinge does not warrant their association with Brown's genus. They are rather small bivalves, radiated posteriorly with crenulated lines, and having closely arranged concentric lines.

LINEARIA METASTRIATA. Pl. 46, fig. 7. Oblong-oval, convex, subequilateral; posterior end subtruncated; disk with fine concentric lines and distinct radiating lines anteriorly, and larger crenulated radii posteriorly; the rest of the surface with microscopic radiating lines; cardinal tooth under the apex widely bifid; lobes small and slender.

Locality.—Eufaula, Alabama. Tuomey's collection.

The shell is thin and fragile, with a very slender cardinal plate. *Arcopagia con-*

centrica, *Rauliniana*, *radiata*, *gibbosa* and *circinalis* of D'Orbigny have all an external resemblance to the genus LINEARIA. I have not seen a species from any American Tertiary formation.

KELLIA, *Turton*.

KELLIA CRETACEA. Pl. 46, fig. 19. Oval, compressed, subequilateral, the anterior side rather longest; surface entire; posterior end obtusely rounded; posterior dorsal and basal margins moderately arcuated.

Locality.—Eufaula, Alabama. Tuomey's collection.

SPHÆRELLA, *Conrad*.

Globose, thin, cardinal plate narrow; posterior cardinal tooth of right valve broad, erect, bifid, parallel with the hinge margin; anterior tooth very small, pyramidal, not oblique; anterior tooth in the left valve triangular, small, pyramidal, entire; posterior tooth elongated, much compressed, very oblique; muscular impressions very large.

This genus having generally been undistinguished from DIPLODONTA, I have given a full generic character, and in addition I may remark that the anterior cardinal margin is extended as a carina, considerably beyond the apex, which is not the case in DIPLODONTA: the muscular scars are much larger and longer than in that genus and extend nearer to the ventral submargin. The prominent summit and great capacity of the umbo will alone distinguish this genus at a glance from DIPLODONTA.

The recent species are *D. orbella*, Gould, a Californian shell; *Lucina costata* from Guayquil, and *L. Novo-Zelandia*, from New Zealand. Thus the genus in the recent state belongs to the Pacific fauna, and in a fossil state is peculiarly American. All the species of DIPLODONTA in Bronn's *Lethea* have the characters of the typical species so well defined that no one of them can be referred to *Sphærella*.

The first appearance of this genus is in the Cretaceous formation, as indicated by the species herein described. In the Eocene of Alabama, or of the other Southern States, I have never found a species, but I obtained four species of DIPLODONTA. In the Miocene there are two species of DIPLODONTA and only one of SPHÆRELLA.

SPHÆRELLA CONCENTRICA. Pl. 46, fig. 4. Subglobose, thin and fragile, equilateral, concentrically striated, striæ prominent and acute except on the umbo, where they are rugose and minute; summit prominent, smooth; umbo inflated and very ventricose.

Locality.—Eufaula. Tuomey's collection.

CRENELLA, *Brown*.Subgenus STALAGMIUM, *Conrad*.

CRENELLA SERICA. Pl. 46, fig. 23. Longitudinally oblong-ovate, very ventricose, finely striated concentrically and with microscopic, closely arranged, radiating lines; summit very prominent.

Locality.—Eufaula, Barbour Co., Alabama. Tuomey's collection.

A very small species, the first of the genus yet found in the American Cretaceous formation. One other, (*Stalagmium margaritaceum*, Conrad,) occurs in the Eocene at Claiborne, Alabama.

CUCULLÆA, *Lam*.

CUCULLÆA MACONENSIS. Pl. 47, fig. 20. Triangular, subequilateral, ventricose; disk flattened on the posterior side; umbonal slope angular, almost terminal; posterior side subcuneate; extremity much above the line of the base, which is profoundly rounded anteriorly; surface without radiating lines; summit prominent, beaks approximate; posterior series of cardinal teeth arched; diaphragm elevated.

Length $5\frac{1}{2}$ inches; height $4\frac{1}{4}$?

Locality.—Chunennugga Ridge, Macon Co., Alabama. Tuomey's collection.

This very large species is mineralized and embedded in a hard gray limestone, replete with casts of undetermined shells, too imperfect in the specimens to identify. This rock probably overlies the Eufaula marl.

NUCULA, *Lam*.

NUCULA CUNEIFRONS. Pl. 46, fig. 33. Triangular, inequilateral, convex; anterior dorsal margin slightly angulated in the middle; frontal area or lunule depressed below the submarginal line, which is acutely angular, slightly concave and terminal; anterior extremity angular; the other margins regularly rounded.

Locality.—Eufaula, Barbour Co., Alabama. Tuomey's collection.

Only one valve occurs, remarkable for the depressed frontal area.

NUCULA PEREQUALIS. Triangular, rather elongated, equilateral, ventricose; dorsal margins equally declining; end margins acutely and equally rounded; basal margin regularly rounded.

Locality.—Occurs with the preceeding.

LEDA, *Shumacher*.

LEDA LONGIFRONS. Pl. 46, fig. 18. Oblong, slightly ventricose, very inequilateral; hinge and basal margins parallel; anterior end acutely rounded, posterior obtusely rounded; cardinal teeth minute and very numerous.

Locality.—With the preceding.

A very thin shell, with a plain surface, only one valve of which is in the Tuomey collection.

TRIGONIA, *Lam.*

TRIGONIA THORACICA, *Morton*. Pl. 47, fig. 10. This species occurs among the Tippah fossils found by Dr. Spillman. It has 14 acute or angular, prominent, oblique ribs; umbonal slope angulated or slightly carinated; posterior slope transversely ribbed, ribs linear; a groove runs obliquely to the extremity of the post umbonal area; this groove is represented within by a short, distinct rib.

VENILIA, *Morton*.

VENILIA TRAPEZOIDEA. Pl. 47, fig. 7. Trapezoidal, inequilateral; disk without distinct concentric ridges; umbonal slope nearly terminal, carinated; posterior extremity truncated, direct.

Locality.—Eufaula, Alabama. Tuomey's collection.

CARDIUM, *Lin.*

Subgenus TRACHYCARDIUM, *Mörch*.

CARDIUM EUFAULENSE. Pl. 46, fig. 12. Obliquely ovate, rather thick in substance, profoundly ventricose; ribs about thirty-eight, smooth, prominent, acutely rounded, on the posterior slope angular, compressed or carinated; summit prominent; beaks contiguous.

Locality.—Tippah Co., Mississippi, and Eufaula, Alabama. Tuomey's collection.

A single small valve of this shell was sent by Dr. Spillman, but specimens as perfect as living shells, except in color, are in Tuomey's collection, one of which is represented in the figure. Among the Cretaceous species of *Cardium* figured by D'Orbigny there is no representative of the *C. Eufaulense*.

CALLISTA, *Poli.*—DIONE, *Gray*.

CALLISTA EUFAULENSIS. Pl. 46, fig. 24. Suboval or suborbicular, convex; margins regularly and almost equally rounded; umbo broad; summit prominent; disk with regular concentric impressed lines which do not extend to the base; anterior cardinal tooth compressed and elongated.

Locality.—Eufaula, Alabama. Tuomey's collection.

A single valve only of this thin, fragile species is in Tuomey's collection.

ASTARTE, *Sowerby*.

ASTARTE CRENALIRATA. Pl. 46, fig. 25. Triangular, convex; costæ about twenty, concentric, very prominent, slightly recurved, crenulated by minute radiating lines; margin within crenulated, crenæ rounded on the posterior margin, and the rest tuberculiform.

Locality.—Eufaula, Alabama. Tuomey's collection.

A small, very perfect shell, elegantly sculptured.

CORBULA, Brug.

CORBULA EUFAULENSIS. Triangular, elevated; larger valve profoundly ventricose, furnished with about twenty very elevated reflexed ribs; beaks almost terminal; umbonal slope carinated and the area behind it very small and laminated; posterior extremity truncated.

Locality.—Eufaula, Alabama. Tuomey's collection.

Remarkable for its large, prominent umbo.

PLICATULA, Lam.

PLICATULA TETRICA. Pl. 46, fig. 26. Adhering, ovate; ribs ten or twelve, prominent, large, distant, bearing oblique, prominent, foliated spines; upper valve flat, slightly convex.

Locality.—Tippah Co., Miss. Dr. Spillman.

Remarkable for its large ribs and thick prominent spines, and the specimens are in excellent preservation. It is distantly related to *P. aspera*, Sowerby.

PLICATULA SAFFORDI. Pl. 46, fig. 34. Ovate, compressed; radii numerous, linear, little prominent, multispinous; upper valve flat.

Locality.—Tennessee. Prof. Safford.

A beautiful species with numerous, frequently erect, small foliated spines.

PECTEN, Lin.

PECTEN ARGILLENSIS. Suborbicular, very thin, compressed; radiated only on the upper part with minute lines; disk covered with closely arranged, fine lamelliform striae, except on the umbo and adjacent parts where they are distant; posterior margin opposite the ear carinated. (Upper valve.)

Locality.—Tippah Co., Alabama. Dr. Spillman.

PECTEN MISSISSIPPIENSIS. Ovate, compressed, very thin; upper valve with about eight distant, narrow, subangular ribs, between which are less prominent ribs, two to three in number; disk covered with minute, closely arranged concentric lines.

Locality.—Tippah Co., Miss. Dr. Spillman.

Shell extremely thin, and having apparently equal ears, rather large in size.

PECTEN SIMPLICIUS. Pl. 46, fig. 44. Ovate, thin, smooth and shining; ears moderate, nearly equal; both valves slightly convex; the upper valve slightly tumid on the umbo; inner margin minutely crenulated.

Locality.—Eufaula, Alabama. Tippah Co., Mississippi.

A small ivory like species, which, judging from the specimens, is abundant, and the principal fossil in a cohering stratum of grey micaceous sand.

SOLENOCERAS, *Conrad*.

Differs from PTYCHOCERAS, *D'Orbigny*, in the smaller tube lying in a furrow, of the larger one, which is straight only for a short distance from the junction, and then suddenly recurved.

SOLENOCERAS ANNULIFER.

Hamites annulifer, Morton. Journ. Acad. Nat. Sciences, 1839, Vol. 8, p. 213, pl. 11, fig. 4.

Locality.—Eufaula, Alabama. Tuomey's collection.

TURRILITES.

TURRILITES SPINIFERA. Sinistral, conical; ribs numerous, rounded, alternately ending in a sharp spine; on the angle of the body whirl the spines are erect, those on the spire projecting very obliquely over the contiguous whirl; umbilicus wide, profound, longitudinally ribbed within.

Length $1\frac{1}{2}$ inches. Diameter the same nearly.

Localities.—Eufaula, Alabama. Mr. Tuomey. Tippah Co., Mississippi. Dr. Spillman.

This is the first undoubted species of *Turrite* I have yet seen from the American strata, and this is very remarkable for its spines, which on the spire lie almost upon the contiguous volution. Tuomey describes a fragment of a species which is described as having a dextral spire.

Family STROMBIDÆ.

PUGNELLUS, *Conrad*.

General form of *Strombus*, with a labrum angular and salient at the upper extremity, with sinus in the upper margin contiguous to the angle or protuberant end of the tip, the outer margin of labrum and submargin very thick or callous; beak straight or curved forwards.

This genus embraces four known species, all of which characterize the Cretaceous period. One occurs in South America, and two in India. The latter are *Strombus uncatus*, Forbes, and *S. cortortus*, Sow.

PUGNELLUS DENSATUS (STROMBUS.) Journ. Acad. Nat. Sciences, iii., p. 330, pl. 46, fig. 31.

ANCHURA, *Conrad*.

ANCHURA ABRUPTA. Pl. 47, fig. 1. Body whirl with a broad revolving rib on a line with the upper extremity of the aperture, with an impressed line on the middle

dividing it into two equal parts; about fourteen revolving tuberculated unequal ribs; labrum produced, thick, birostrate, outer margin straight; columella deposit broad and thick; the posterior margin abrupt, subcarinated; beak elongated, curved, spiniform; submargin of the outer extremity of labrum acutely carinated within.

Locality.—Tippah Co., Mississippi. Dr. Spillman.

Fragments alone of this species are in Dr. Spillman's collection, the largest specimen of which measures $1\frac{3}{8}$ inches in breadth of body volution.

TURRITELLA, *Lam.*

TURRITELLA TIPPANA. Journ. Acad., Vol. 3, p. 333.

Dr. Spillman has forwarded fine specimens of TURRITELLA, which may be varieties of this species. One is four inches long, and has on each of the larger whirls of spire four prominent, revolving lines, the two upper pair smaller and more approximate than the lower pair; the wide interval between the two pair of ribs is finely striated with unequal lines. Another specimen two inches long is similarly striated with fine lines, whilst the large, revolving lines are six in number on each whirl and much less prominent than in the preceding species. These lines though unequally are yet more regularly arranged than in the variety above described.

TURRITELLA TRILIRA. Turritid; whirls with three equidistant, very acute, prominent ribs; revolving lines microscopic, closely arranged.

Length $2\frac{1}{2}$? inches.

Locality.—Tippah Co., Mississippi. Dr. Spillman.

DAPHNELLA? *Hinds.*

DAPHNELLA? EUFAULENSIS. Fusiform, whirls slightly convex ribs, rather distant, revolving lines minute, impressed, not very closely arranged; spire considerably longer than the aperture and beak, and consisting of about ten whirls.

Length $1\frac{1}{2}$ inches; width $\frac{1}{4}$ inch.

Locality.—Eufaula, Alabama. Tuomey's collection.

The smooth surface between the ribs and the impressed lines give the sculpture a resemblance to that of ACTÆON, *Mont.*

DAPHNELLA? SUBFILOSA. Spire elongate-conical, volutions eight, rounded, deeply impressed at suture, ribs numerous; revolving lines minute, rugose, raised and very closely arranged; spire nearly or quite equal in length to beak and aperture; columella arched; aperture elliptical.

Length $1\frac{1}{2}$ inches; width $\frac{3}{8}$ nearly.

Locality.—Occurs with the preceding.

Wider than the last and very distinct.

DAPHNELLA? LINTEA. Pl. 46, fig. 47. A fragment, with closely arranged, fine,

rugose, unequal, revolving lines, and without ribs; lines of growth distinct; whirls slightly concave above, and below the suture is a wide, little elevated ridge.

A small species, apparently elongated.

Locality.—Occurs with the preceding.

DRILLIA? *Gray*.

DRILLIA? DISTANS. Pl. 46, fig. 49. Fusiform; spire and aperture about equal in length; whirls slightly convex inferiorly, ridged below the suture; ridge crenate-striate; ribs rounded, distant; revolving lines distinct on the beak and towards the summit, elsewhere obsolete; beak slightly produced.

Locality.—Eufaula, Alabama. Tuomey's collection.

FUSUS, *Klein*.

FUSUS TIPPANA. Pl. 46, fig. 41. Fusiform; spire conical, acute; whirls seven, angulato-concave above; angle near and above the suture salient and tuberculated; revolving lines obsolete on the spire, large and prominent on the body whirl, is carinated by a larger, more prominent line running from near the upper extremity of the aperture; beak slightly recurved, about equal in length to the spire.

Length $1\frac{1}{8}$ inches.

Locality.—Tippah Co., Mississippi. Dr. Spillman.

STREPSIDURA, *Swainson*.

STREPSIDURA RIPLEYANA. Pl. 46, fig. 42. Fusiform, longitudinally ribbed; ribs numerous, angular, acute, revolving lines distinct; body whirl ventricose, shoulder angular, subcarinated, disposed to be tuberculated, angulato-concave above; a row of tubercles margins the suture inferiorly; spire scalariform; volutions five; beaks sinuous.

Length $1\frac{7}{8}$ inches; width $\frac{3}{4}$ inch.

Locality.—Occurs with the preceding. Dr. Spillman.

VOLUTILITHES, *Swainson*.

VOLUTILITHES EUFAULENSIS. Pl. 47, fig. 18. Fusiform, moderately thick; about twelve distant ribs on the body volution; ribs angulated, prominent, wanting towards the beak, very prominent at the superior termination on the shoulder; volutions about nine; spire short; above the angle of the body whirl space concave, with rather closely arranged, wrinkled, revolving lines prominent on the penultimate whirl; on the body whirl they consist of slightly impressed, rather wide furrows; columella with one very oblique fold. Length $5\frac{1}{2}$ inches; width $2\frac{1}{2}$ inches.

Locality.—Eufaula, Alabama. Tuomey's collection.

The largest species of *Volutilithes* probably yet discovered. On the ridge below the suture are oblique plications or irregular lines, some of which are acute.

ACTÆON, *Mont.*

ACTÆON MODICELLUS. Elliptical, very small; rather thick in substance; revolving lines impressed and striato-punctate; columellar plait obtuse; spire conical.

Locality.—Tippah Co., Mississippi. Dr. Spillman.

A very small species requiring a lens to distinguish its sculpture.

TURBONILLA.

Subgenus CHEMNITZIA.

Shell conical or elongated, broad at base and rapidly tapering to the apex; aperture acutely oval or elliptical.

The shells of this subgenus are very large, and broad in the body whirl compared with the recent species of *TURBONILLA*, and characterize the Cretaceous strata, not one, at least in America, having survived that period.

T. (CHEMNITZIA) CORONA. Pl. 46, fig. 50. Turrited, whirls carinated above the suture, which is profound; 3 robust revolving undulated lines on each volution, with a plain space above; whirls profoundly coronated on the upper margin.

Locality.—Tippah Co., Mississippi. Dr. Spillman.

A fragment, with three whirls, is all I have seen of this magnificent shell, one of the largest and certainly the most elegant species of the subgenus *CHEMNITZIA* yet discovered. Behind the remarkable coronation of the volutions there is a profound channel, and the carina above is tuberculous. The outline of the aperture is not exhibited in the fragment.

T. (CHEMNITZIA) SPILLMANI. Pl. 46, fig. 48. Conical-elongate; whirls with straight sides; obtusely costate, costæ broad, approximate; revolving lines on each whirl four in number, distant, impressed.

Locality.—Occurs with the preceding. Dr. Spillman.

A fragment, consisting of three whirls and broken at the base.

Although I have grouped these beautiful fossils in a subgenus, I believe they are generically distinct from *TURBONILLA* as founded on small existing shells. I have retained the name *CHEMNITZIA*, although not applied by D'Orbigny to characterize especially this fossil group, in order to retain the name of one of the fathers of Conchology.

T. (CHEMNITZIA) MELANOPSIS. Pl. 46, fig. 35. Subulate, whirls nine, flattened on the sides; ribs angular, slightly curved, about seventeen in number on the body whirl; revolving lines distinct, unequal, about seventeen in number on the penultimate whirl; suture impressed, slightly waved; aperture long, elliptical.

Locality.—Occurs with the preceding. Dr. Spillman.

T. (CHEMNITZIA) LAQUEATA. Pl. 46, fig. 36. Subfusiform; spire conical-acute; whirls slightly convex, seven or eight in number; ribs distant, subangular, interrupted near the summit by a revolving impressed line, above which the penultimate and body whirl are plicated; aperture long, elliptical.

Length of aperture $\frac{1}{2}$ inch.

Locality.—Occurs with the preceding. Dr. Spillman.

T. (CHEMNITZIA) TRIGEMMATA. Pl. 47, fig. 33. Turrited; whirls seven, convex; ribs distant, with three subequal tubercles; the ribs become obsolete towards the suture, where there are two revolving lines, minutely beaded in a line with the ribs; suture profound, an impressed line revolving immediately above; base with six revolving carinated lines.

Length $1\frac{1}{4}$ inches.

Accompanying the above are specimens of univalves, embracing the following Eocene species: *Mitra pactilis*, C., *Cancellaria gemmata*, C., *C. alveata*, C., *Calyptraphorus trinodiferus*, C. All except the last are Claiborne species.

TUDICLA, Bolton.

Subgenus PYROPSIS, Conrad.

Spire very short, apex not papilated; labrum without striæ within, thick; collumella without a fold.

T. (PYROPSIS) PERLATA. Pl. 46, fig. 39. Pyriform, tricarinated; body whirl very wide, profoundly carinated and spinous above; the lower carina or rib less prominent than the middle one; revolving lines crenulated or subtuberculated, alternated on the upper part of the body whirl; aperture wide; labrum margin crenulated.

Locality.—Tippah Co., Mississippi. Dr. Spillman.

This subgenus appears to be characteristic of the Cretaceous period, none having been found in other formations.

NERITINA, Lam.—NERITELLA, Humph.

NERITINA DENSATA. Pl. 46, fig. 37. Semiglobose, thick, solid; spire concealed; labium callous, rounded, with an interior fold on the upper part.

Locality.—Occurs with the preceding.

This is the first species of NERITINA yet discovered in America in a fossil state. It is about the size of *Neritina squamifera*, and retains a distinct trace of the colored markings, which in form are not unlike those of the *squamifera*. Its habitat was no doubt in brackish water of estuaries, like that of the only recent species of the United States *N. reclinata*, Say. Both of them differ from typical species in having thick

shells and rounded, callous columella. I propose to class them in a subgenus under the name of NEREIS.

NATICA, *Lam.*

Subgenus GYRODES, *Conrad.*

Globose, thin in substance; whirls channelled above; umbilicus profound, without a callus on the columella or base.

A group of thin-shelled Cretaceous forms of the Naticidæ family, casts of which have long been familiar to us from the New Jersey deposits. *Natica petrosa*, Morton, belongs to the subgenus.

N. (GYRODES) CRENATA. Channel on the spire rather wide, not profound; apex flattened; shoulder obliquely plicated; umbilicus patulous, carinated within near the base, and the periphery acutely carinated and crenulated; volutions visible to the apex in the umbilicus.

Locality.—Tippah Co., Mississippi. Dr. Spillman.

A species remarkable for the size of umbilicus and its acute, crenulated margin.

N. (GYRODES) ALVEATA. Pl. 46, fig. 45. Channel of spire wide and margined by a carina; spire slightly prominent, apex acute; whirls slightly contracted below the carina, five in number; umbilicus moderate in diameter, without a revolving line.

Locality.—Occurs with the preceding. Dr. Spillman.

TURBINOPSIS, *Conrad.*

Turbinate; spire conical; whirls channelled at the suture; umbilicus profound; inner and outer lip continuous above and separated from the body whirl; columella concave with a very oblique fold near the basal margin.

There appear to be two or more species of this genus in the Cretaceous strata of New Jersey, occurring in the state of casts, one of which I think is identical with the present shell. This genus is allied to CANCELLARIA, *Lam.*

TURBINOPSIS HILGARDI. Pl. 46, fig. 29. Turbinate; whirls of spire four or five, subangular; shell with prominent, flattened, revolving ribs below the angle of each whirl, above are unequal, rugose, impressed lines; eight ribs on the body volution, and a few striæ near the margin of the umbilicus, which is very wide and exhibits the volutions to the apex; umbilical margin acute and salient; aperture suboval.

Locality.—Tippah Co., Mississippi. Dr. Spillman.

TUBA? *Lea.*

TUBA? BELLA. Pl. 46, fig. 38. Turritid; whirls nine, rapidly increasing in size,

convex, excavated at suture; whirls of spire have three revolving ribs, and the body whirl, which is ventricose, about fourteen; a fine line revolves between the ribs; ribs and lines elegantly crenulated by regular, closely arranged, fine lines; body whirl regularly rounded at base.

Length $1\frac{1}{8}$ inches; diameter $\frac{3}{8}$ inch.

Locality.—Eufaula, Alabama. Tuomey's collection.

Another species, *Tuba antiquata* (*Meleagris*), Con., occurs in the Eocene.

MOREA, *Conrad*.

Short-elliptical; aperture much longer than spire; columella reflexed, concave, with a prominent, acute fold at base.

MOREA CANCELLARIA. Pl. 46, fig. 30. Cancellated; revolving furrows profound, equal except on the shoulder; where the lines cross the ribs they form square tubercles; ribs eight on the body whirl; spire short, conical; whirls four, lower whirl tricostate; base finely bicarinate, with transverse, curved lines; umbilicus channel angulato-concave, long and narrow; aperture elliptical; labrum margin crenate or waved.

Length 1 inch; width $\frac{5}{8}$ inch.

Locality.—Eufaula, Alabama. Tuomey. Tippah Co., Mississippi. Dr. Spillman.

A beautiful shell, with a widely reflexed labium and the tubercles showing through the deposit on the upper part.

THYLACUS, *Conrad*.

Ear-shaped, oblong, rounded; aperture long, contracted above; apex not spiral.

THYLACUS CRETACEUS. Pl. 46, fig. 22. Oblong, contracted below the middle; apex prominent, terminal.

Locality.—Tippah Co., ~~Alabama~~^{Mississippi}. Dr. Spillman.

PLACUNANOMIA, *Broderip*.

Subgenus PARANOMIA, *Conrad*.

Inequivalve, irregular; larger valve radiate, spinous or subspinous; lower valve flat or concave; hinge very thin and fragile, having a longitudinal flat shelly plate extending from the apex; hinge of upper valve plain, entire, extremely thin.

I have often found fragments of this singular genus in the New Jersey Cretaceous beds, but never saw the hinge before Mr. Safford's specimens were received from Tennessee. The muscular impression is not visible on any of the many valves I have seen.

PLACUNANOMIA SAFFORDI. Pl. 46, fig. 21. Suborbicular or obtusely subovate, very

thin, much impressed; lower valve flat or slightly concave; both valves radiated with raised lines, which are ornamented with small foliated spines.

Locality.—Tennessee. Mr. Safford.

PLACUNANOMIA LINEATA. Pl. 46, fig. 20. Subovate, thin, much compressed, irregular; lower valve concave, obsoletely radiate; near the summit is a resemblance to a triangular plate inserted in the shell with a raised margin; this portion is longitudinally minutely striate and resembles one of the opercular valves of a *Balanus*; upper valve convex, lobed or twisted; radiated with about thirty rugose, slightly raised, subaculeated lines; surface rugose.

Locality.—Tennessee. Mr. Safford.

The hinge of these shells differs from that of the recent PLACUNANOMIA in the upper valve being destitute of the diverging teeth. In both species the orifice is completely closed by the plug or ossified tendon of adhesion.

ECHINODERMS.

CASSIDULUS, Lam.

CASSIDULUS ABRUPTUS. Obtusely ovate, flat beneath, very convex above; lateral margins convex, anterior slope more oblique; posterior slope abrupt, ambulacra lanceolate; mouth central; anus small, oblong oval, with a furrow beneath.

Locality.—Tippah Co., Miss. Dr. Spillman.

CASSIDULUS SUBQUADRATUS. Pl. 47, fig. 19. Suborbicular, flat beneath, flexuous posteriorly; lateral and end slopes truncated; anus very large, obtusely ovate, with a depression beneath extending to the margin which at that point is salient; ambulacra lanceolate.

Length $3\frac{1}{2}$ inches. Diameter $2\frac{1}{4}$ inches. Height $1\frac{1}{2}$ inches.

Locality.—Occurs with the preceding. Dr. Spillman.

Dr. Showalter, of Uniontown, Alabama, has sent me some Eocene shells which appear to be new, and are from a locality further north in Alabama than any Mr. Tuomey had explored. With these I have included a description of an Eocene shell from Mississippi sent by Dr. Spillman, and a few species from Alabama in the collection of the Academy.

EXILIA, Conrad.

EXILIA PERGRACILIS. Pl. 48, fig. 34. Narrow-fusiform; volutions twelve, convex, with slightly curved, numerous, narrow ribs, and fine closely-arranged revolving

lines; spire rather longer than aperture, first two whirls smooth; beak perfectly straight, minutely striated to the extremity.

Locality.—Alabama. Dr. Showalter.

Mattus Landig Ala
Groggs Landig

VOLUTILITHES, *Swainson*.

VOLUTILITHES LIMOPSIS. Pl. 47, fig. 24. Subfusiform; volutions seven; body whirl longitudinally ribbed; ribs angular, acutely tubercular on the upper part; revolving lines prominent, acute, more salient where they cross the ribs, about twenty-seven in number; whirls of spire slightly convex, five series of tubercles on last volution; aperture narrow-elliptical; inner lip with a thin, wide deposit; columella with three plaits, the superior one obsolete or very small.

Length $1\frac{3}{8}$ inches. Diameter $\frac{5}{8}$ inch.

A beautiful species resembling *V. crenulata*, Lam., or more nearly *V. ambigua*, but it has a more fusiform shape than either, a narrower aperture and dissimilar folds on the columella.

VOLUTILITHES RUGATA. Pl. 47, fig. 32. Fusiform; spire somewhat elevated; volutions eight, convex, with minute, reticulated lines, the revolving lines microscopic; larger revolving lines prominent; ribs on the body whirl irregular, wanting near the base; an impressed line revolves below the suture, giving that part of the shell between this line and the suture an obscurely or obtusely carinated character; revolving lines on the body whirl distinct; a deposit on the inner tip; columella with three approximate, obtuse folds, the middle one obsolete; aperture narrow.

Length 2 inches.

Subgenus ATHLETA, *Conrad*.

V. (ATHLETA) LEIODERMA. Pl. 46, fig. 32. Subfusiform, smooth and polished; spire scalariform, angle callous; shoulder over the aperture with a projecting callus; aperture long and effuse; labrum slightly notched or sinuous at the superior extremity; columella 4-plaited; plaits very oblique; superior one obsolete.

Locality.—Tippah Co., Mississippi. Dr. Spillman. (Cretaceous.)

A beautiful and very perfect shell, the suture covered by a deposit as in the genus ANCILLA.

SIMPULUM, *Klein*.—TRITON, *Lam*.

The type of this genus is *Triton succinctum*, Lamarck.

SIMPULUM SHOWALTERI. Pl. 47, fig. 11. Fusiform; whirls eight, angular, periphery of angle acute, situated below the middle of the whirl; whirls of spire costate longitudinally, but not very distinctly; revolving lines closely arranged, fine, with a few distant, prominent lines; three first whirls of the spire smooth, the next two tuberculated; angle tuberculated; a prominent, acute line on the body whirl runs from the

upper extremity of the aperture, and a similar finer line between it and the angle above; columella rugose, with a prominent fold near its upper end; labrum dentate within.

Length $1\frac{3}{8}$ inches.

SIMPULUM AUTOPSIS. Pl. 47, fig. 25. Subfusiform; whirls rounded, seven in number, cancellated; revolving lines most conspicuous, alternated in size, the largest beaded finely, and about fourteen in number on the body whirl, exclusive of beak; aperture with beak about half the length of the shell; apex obtuse, three first whirls smooth and the second and third turned.

Length $1\frac{1}{8}$ inches.

Subgenus EPIDROMUS, *Klein*.

S. (EPIDROMUS) EXILIS. Pl. 47, fig. 31. Elongated; whirls seven, rounded; ribs longitudinal, numerous; revolving lines fine and raised, eleven or twelve on the penultimate whirl; body whirl striated to the base; spire much longer than aperture; columella plain and obtusely carinated at base; labrum striated within; peristome sinuous.

Length $\frac{1}{2}$ inch.

Type of this subgenus *Triton maculosum*, Lam.

GALEODIA, *Link*.

GALEODIA TRICARINATA. Elliptical; whirls eight, those of the spire convex; penultimate obscurely angulated; shoulder of body whirl flattened, oblique; revolving lines strongly marked, alternated in size; whirls towards the apex cancellated; whole surface ornamented with fine longitudinal lines; body whirl with three distant, carinated lines, the upper one slightly tuberculated; labrum profoundly striate or costate within; columella with a deposit and profoundly rugoso-striate throughout.

Length $2\frac{1}{8}$ inches.

Locality.—Vicksburg, Mississippi.

SCONSIA, *Gray*.

SCONSIA LINTEA, *Conrad*, (*Cassidaria linteae*) Journ. Acad., New Series, Vol. 1, p. 118.

CITHARA, *Schum*.

CITHARA NEREIDIS. Elliptical or subfusiform; spire short, conical; body whirl ventricose; ribs numerous, about sixteen in number; revolving lines obsolete, distinct towards the base; columella folds prominent.

Length 1 inch.

MUREX, *Lin*.

MUREX MORULUS. Pl. 47, fig. 28. Fusiform; whirls angular, with distant spines on the angle, two or three of which are produced; ribs longitudinal, oblique, foliated,

acute; angle of body whirl situated about the middle of the shell; beak sinuous, angle of aperture extending into an elongated, recurved spine.

Length $\frac{5}{8}$ inch.

PSEUDOLIVA, *Swainson*.

PSEUDOLIVA TUBERCULIFERA. Pl. 47, fig. 27. Short-subfusiform, with well defined revolving lines; angle of body whirl with compressed tubercles; whirls of spire longitudinally ribbed, the penultimate whirl indistinctly ribbed; above the angle of the body whirl the area is slightly concave and tumid or salient above; umbilicus none.

Length 1 inch; diameter $\frac{5}{8}$ inch.

SCALA, *Klein*.

SCALA OCTOLINEATA. Turritid; whorls longitudinally costate; ribs distant, very prominent, laminar; revolving lines distant, prominent, continued over the right sides of each varix, the other side rugose; varices very prominent; base with a carina.

Length about $1\frac{1}{2}$ inches.

Locality.—Mississippi. Dr. Spillman.

SCALA STAMINEA. Subulate; whorls regularly rounded; ribs and revolving lines closely arranged, very fine; base carinated; below the carina ribs obsolete.

Locality.—Claiborne, Alabama.

SCALA LINTEA. Turritid; whorls ventricose, broad on the body whirl and rapidly tapering to the apex; ribs numerous, not close, rising near the suture into subspinous foliations; revolving lines smooth, unequal, rugose.

Length $1\frac{1}{2}$ inches.

Locality.—Claiborne, Alabama.

ACTEONINA, *D'Orbigny*.

ACTEONINA SUBVARICATA. Pl. 44, fig. 22. Broadly elliptical; spire short, conical; whorls scarcely convex; revolving lines minute, slightly impressed, closely arranged; one or two obscure varices; aperture narrow.

Locality.—Alabama. Dr. Showalter.

TORNATELLÆA, *Conrad*.

Ovate, ventricose; columella with two slender, prominent folds, the lower fold not distinctly continuous with the margin of the base.

TORNATELLÆA BELLA. Pl. 47, fig. 23. Ovate; spire conical; revolving lines numerous, impressed, punctate-striate.

MENESTHO, *Müller*.

MENESTHO STRIATA, (*Pusithea striata*, Lea.) This shell does not represent the genus MONOPTYGMA, *Lea*, the type of which is an ANCILLA with a tumid columella. Menestho and Monoptygma are very different genera, but are associated in "Adams' Genera."

CERITHIODERMA, *Conrad*.

Acutely ovate, striate; labium grooved and umbilicate; columella recurved inferiorly or subtruncate; aperture patulous, margin obtusely rounded inferiorly; beak very short, narrow, recurved.

CERITHIODERMA PRIMA. Pl. 47, fig. 30. Acutely ovate; spire conical; whirls rounded, eight; body whirl large and ventricose; whirls of spire reticulated; body whirl with longitudinal ribs or undulations and very fine lines; revolving lines prominent, largest about the middle of the whirl, fine at the base; suture profoundly impressed.

MAZZALINA, *Conrad*.

Turbinate, smooth; columella projecting interiorly and furnished with closely arranged, oblique, obtuse plaits.

MAZZALINA PYRULĀ. Pyriform, moderately thick in substance; spire conical, whirls carinated below the suture; columella with eight plaits; beak slightly recurved; labrum with prominent, acute lines within.

Length $1\frac{1}{2}$ inches. Diameter 1 inch.

LEDA, *Shum*.

LEDA EBOREA. Pl. 47, fig. 26. Triangular, equilateral, ventricose smooth polished; lunules of equal length and defined by carinated lines; anterior lunule widely elliptical; dorsal margin when the valves are together defined by a slight carina; a slight furrow near the posterior dorsal margin and parallel with it; posterior end acutely rounded and the submargin slightly contracted; base regularly rounded.

Length $\frac{5}{8}$ inch.

LEDA BELLA, *Conrad*. A variety of this Claiborne species accompanies the preceding. The concentric lines are less conspicuous, and the transverse wrinkles on the upper anterior side which are so prominent in the Claiborne shell are obsolete in this.

AXINÆA, *Poli*.

AXINÆA BELLASCULPTA. Suborbicular, convex, equilateral; radii in the middle of the disk trilineate, radiating lines conspicuous to the margins, anteriorly somewhat

interrupted; concentric lines numerous, regular, minute; margin within densely crenulate.

Locality.—Mississippi. Dr. Spillman.

PTEROPSIS, *Conrad*.

Ovate, thin, equivalve; hinge plate very broad with an ovate cartilage pit; anterior cardinal tooth very large and elevated, V shaped, anterior to the pit, bifid and extending to the inner margin of cardinal plate; posterior tooth, long, elevated, compressed, oblique; posterior cardinal plate widely and profoundly channelled. (Left valve.)

PTEROPSIS PAPYRIA, (LUTRARIA.) *Conrad*. Amer. Journ. Science, Vol. I. (New Series,) p. 216, pl. 1, fig. 8.

The generic diagnosis of this shell readily distinguishes it from *Raëta*, Gray, and its form is very different; the umbo being direct, and the beak much anterior to the middle of the valve, whilst in the allied genus it is posterior; I found two left valves only of this beautiful and curious shell. The genus, no doubt, is peculiar to the Eocene; casts are not uncommon in the same formation in South Carolina.

DIPLODONTA, *Brown*.

DIPLODONTA ASTARTIFORMIS. Ovate-triangular, rather thick in substance; equilateral, slightly ventricose; lateral slopes very oblique and nearly equal; umbo and summit direct.

Locality.—Claiborne, Alabama.

DIPLODONTA DELTOIDEA. Obtusely ovate-triangular, convex, equilateral; posterior side subcuneiform, the subangulated extremity being about midway between beak and base.

Length $\frac{3}{8}$ inch, nearly.

Locality.—Claiborne, Alabama.

CRENELLA, *Brown*.

CRENELLA LATIFRONS. Obliquely suboval, inflated, thin, highly perlaceous; anterior side produced or alated above; striæ very closely arranged, elegant and minute, cancellate anteriorly.

Locality.—Alabama. Dr. Showalter.

*Synopsis of the genus LIMOPSIS in the Eocene of Alabama.*LIMOPSIS, *Sassi*.

1. L. CUNEUS, *Conrad*. Pl. 46, fig. 17. (PECTUNCULUS) Tert. Foss. 1st ed. p. 39.
Appendix to Morton's Organic remains of Cretaceous Group, p. 6.

Cuneiform, inequilateral; umbonal slope acutely angular, nearly terminal.

Length $\frac{3}{8}$ inch.

Locality.—Occurs with the preceding. Dr. Showalter.

- ✓2. L. DECLIVIS, *Conrad*. (PECTUNCULUS) Tert. Foss., 1st ed. p. 39. *Pl 47 + 13*

3. L. AVICULOIDES, *Conrad*. Pl. 47, fig. 12. (PECTUNCULUS) Tertiary Fossils,
1st ed., p. 39.

4. L. ELLIPSIS, *Lea*. Pl. 47, fig. 9. (PECTUNCULUS) Contrib. to Geology, pl. 3,
fig. 56. *Pl 47 + 9*

5. L. DECISUS, *Conrad*. Pl. 47, fig. 16. (PECTUNCULUS) Tert. Foss., 1st ed. p. 39.

6. L. PERPLANUS, *Conrad*. ~~Pl. 47, fig. 16.~~ (PECTUNCULUS) Ibid. ~~“ “~~ *? not right*

7. L. CORBULOIDES, *Conrad*. (PECTUNCULUS) Ibid. “ 40.

REFERENCE TO PLATE XLVI.

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| <p>Fig. 1. <i>Periploma applicata</i>.
 2. <i>Dosinia obliquata</i>.
 3. <i>Pholadomya anteradiata</i>.
 4. <i>Sphacrella concentrica</i>.
 5. <i>Crassatella lineata</i>.
 6. <i>Dosinia depressa</i>.
 7. <i>Linearia metastriata</i>.
 8. <i>Dosinia</i> ? (inedited.)
 9. <i>Crassatella pteropsis</i>.
 10. <i>Tellina limatula</i>.
 11. <i>Sanguinolaria cretacea</i>.
 12. <i>Nucula axinea</i>.
 13. <i>Cardium Eufaulense</i>.
 14. <i>Tellina eborea</i>.
 15. <i>Tellina Eufaulense</i>.
 16. <i>Diplodonta parilis</i>.
 17. <i>Cardium linteum</i>.
 18. <i>Leda longifrons</i>.
 19. <i>Kellia cretacea</i>.
 20. <i>Placunanomia lineata</i>.
 21. <i>Placunanomia Saffordi</i>.
 22. <i>Thylacus cretaceus</i>.
 23. <i>Crenella serica</i>.
 24. <i>Callista Eufaulense</i>.
 25. <i>Astarte crenulirata</i>.
 26. <i>Plicatula tetrica</i>.</p> | <p>Fig. 27. <i>Bullopsis cretacea</i>.
 28. <i>Turbonilla Spillmani</i>.
 29. <i>Turbinopsis Hilgardi</i>.
 30. <i>Morea cancellaria</i>.
 31. <i>Pugnellus densatus</i>.
 32. <i>Volutilithes (Athleta) leioderma</i>.
 33. <i>Nucula cuneifrons</i>.
 34. <i>Plicatula Saffordi</i>.
 35. <i>Turbonilla (Chemnitzia) laqueata</i>.
 36. <i>Turbonilla (Chemnitzia) melanopsis</i>.
 37. <i>Neretina densata</i>.
 38. <i>Tuba</i> ? <i>bella</i>.
 39. <i>Tudicla (Pyropsis) perlata</i>.
 40. <i>Cardium Spillmani</i>. (Young.)
 41. <i>Fusus Tippanus</i>.
 42. <i>Strepsidura Ripleyana</i>.
 43. <i>Opis</i> ? (inedited.)
 44. <i>Pecten simplicius</i>.
 45. <i>Natica (Gyrodes) alveata</i>.
 *46. <i>Cardium Arkansense</i>.
 47. <i>Daphnella</i> ? <i>lintea</i>.
 48. <i>Turbonilla Spillmani</i>.
 49. <i>Drillia</i> ? <i>distans</i>.
 50. <i>Turbonilla (Chemnitzia) corona</i>.
 51. <i>Pulvinites argentea</i>.
 52. Inedited.</p> |
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REFERENCE TO PLATE XLVII.

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| <p>Fig. 1. <i>Anchura abrupta</i>.
 2. <i>Pyrifusus subdensatus</i>.
 3. <i>Pecten Burlingtonensis</i> ?
 †4. <i>Ancyloceras</i> ? <i>approximans</i>.
 ‡5. <i>Baculites (Cycloceras) annulatus</i>.
 6. <i>Mitra Claibornensis</i>.
 7. <i>Venilia trapezoidea</i>.
 8. <i>Inoceramus filusus</i>.
 9. <i>Limopsis ellipsis</i>. (Eocene.)
 10. <i>Trigonia thoracica</i>.
 11. <i>Simpulum Showalteri</i>.
 12. <i>Limopsis aviculoides</i>. "
 13. <i>Limopsis declivis</i>. "
 14. <i>Ancilla cretacensis</i>.
 15. <i>Legumen appressus</i>.
 16. <i>Limopsis decius</i>. "
 17. <i>Limopsis cuneus</i>. "
 18. <i>Volutilithes Eufaulensis</i>.</p> | <p>19. <i>Cassidulus subquadratus</i>.
 20. <i>Cucullæa Maconensis</i>.
 <i>Eocene Species.</i>
 21. <i>Calyptrophorus velatus</i>.
 22. <i>Acteonina subvaricata</i>.
 23. <i>Tornatellæa bella</i>.
 24. <i>Volutilithes limopsis</i>.
 25. <i>Simpulum autopsis</i>.
 26. <i>Leda eborea</i>.
 27. <i>Pseudoliva tuberculifera</i>.
 28. <i>Murex morulus</i>.
 29. <i>Calyptrophorus trinodiferus</i>.
 30. <i>Cerithioderma prima</i>.
 31. <i>Simpulum exilis</i>.
 32. <i>Volutilithes rugata</i>.
 33. <i>Turbonilla trigemmata</i>.
 34. <i>Exilia pergracilis</i>.
 35. <i>Volutilithes (Athleta) Tuomeyi</i>.</p> |
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*Proceedings of Acad., 1855, p. 266.

†Ibid.

‡Ibid. p. 265

ART. IX.—*Descriptions of some New Species of Cretaceous Fossils.*

BY WM. M. GABB.

CHEMNITZIA, *D' Orb.*

C. MEEKANA. Pl. 48, fig. 1. Shell fusiform; whorls six or seven; mouth nearly half the length of the shell, a little the widest near the lower end; surface marked by prominent, longitudinal ribs.

Locality and position.—From the white limestone of Prairie Bluff, Alabama. Collection of the Academy.

ACTÆONINA, *D' Orb.*

A. NATICOIDES. Pl. 48, fig. 2. Shell globose; whorls three or four; spire very slightly elevated; surface marked by numerous revolving lines.

Locality and position.—From the marl of New Jersey.

There are two specimens in the Academy's collection; one from Burlington Co., N. J. The locality of the other is unknown. One specimen in my own collection is from Mullica Hill. It was found with *Exogyra costata*, *Gryphæa vesicularis*, *Rostellaria pennata*, *Baculites*, *Natica abyssinis*, &c.

The only fossil with which this could be confounded is *Actæon concinna*, Hall and Meek, from which its wider mouth, as well as its two plates on the columella, will serve to distinguish it.

PHASIANELLA, *Lam.*

P. PUNCTATA. Pl. 48, fig. 3. Shell elevated above, rounded below; whorls five; mouth about two-fifths the length of the shell; spire elevated; surface marked by numerous, minute punctations, arranged in revolving lines.

Locality and position.—Mullica Hill, N. J., with the above. My own collection.

STRAPAROLUS, *Montf.* (*Euomphalus*, J. Sow.)

S. SUBPLANUS. Pl. 48, fig. 4, *a*, *b*.—Shell nearly flat above, subangular below; whorls two; mouth subquadrangular, more rounded below than above; surface marking unknown. A cast.

Locality and position.—White limestone, Prairie Bluff, Alabama. Collection of the Academy.

STRAPAROLUS LAPIDOSUS.

DELPHINULA LAPIDOSA, *S. G. M.* Pl. 48, fig. 5, *a, b.* After examining the type of Morton's species I am convinced that it cannot belong to the genus Delphinula. I therefore refer it to the above genus, to which it appears to belong. The figures show the generic characters more strongly than in the original figure.

VOLUTILITHES, *Sow.*

V. BIPPLICATA. Pl. 48, fig. 6. Shell fusiform, robust; whorls four; spire low; mouth two-thirds the length of the shell, two folds on the columella; surface markings unknown. A cast.

Locality and position.—Brown marl, Burlington Co., N. Jersey. Collection of the Academy.

V. BELLA. Pl. 48, fig. 7. Shell fusiform, slender; whorls five; spire elevated; mouth about three-fifths the length of the shell; two folds on the columella; surface markings unknown. A cast.

Locality.—Delaware and Chesapeake Canal. Collection of the Academy.

V. SAFFORDI. Pl. 48, fig. 8. Shell fusiform, wider than the preceding species; whorls four or five; spire low; mouth three-fourths the length of the shell; two folds on the columella; surface marked by longitudinal ridges, crossed by smaller revolving lines.

Locality.—Tennessee. Prof. Safford.

V. NASUTA. Pl. 48, fig. 9. Shell elongated, narrow; whorls about four; spire very elevated; mouth about two-thirds the length of the shell; three folds on the columella; surface markings unknown. From traces on the cast, apparently marked by crossed revolving striae.

Locality.—Monmouth Co., N. J. My own collection.

There is a fragment in the collection of the Academy, found at Crosswicks, N. J., and apparently belonging to this species, nearly twice the size of the specimen figured. This species somewhat resembles *V. Texana* (*Rostellites Texana*, Con.) but can be readily distinguished by its being smaller, more slender, and by its having but three folds on the columella, while the latter has at least eight or nine.

V. CONRADI. Pl. 48, fig. 10. Shell fusiform, tapering; whorls about four; spire small and but slightly elevated; upper side of the whorls subangular; surface markings unknown. From marks on the cast, it was apparently ornamented by longitudinal ridges, crossed by revolving lines; one fold on the columella.

Locality and position.—Green marl, Crosswicks, N. Jersey. Collection of the Academy.

FUSUS, *Lam.*

F. RETIFER. Pl. 48, fig. 11. Shell pyriform; spire slightly elevated; mouth wide, outer lip slightly reflected (?); surface crossed by two series of impressed lines so as to present a pavement-like appearance.

Locality and position.—Mullica Hill, N. J., with *Actæonina naticoides*, *Phasianella punctata*, &c. My collection.

RAPA, *Klein.*

R. ELEVATA. Pl. 48, fig. 12. Shell subfusiform; spire rather more elevated than in the majority of species of this genus; mouth angular, patulous; surface apparently marked by revolving striæ; canal unknown. A cast.

Locality and position.—Brown marl, Burlington Co., N. J. The canal of this shell has probably been prolonged, but the specimen is so broken that it is impossible to determine. Collection of the Academy.

SCONSIA, *Gray.*

S. ALABAMENSIS. Pl. 48, fig. 13. Shell subfusiform; mouth two-thirds the length of the shell; surface markings unknown; whorls five; the cast presents the remains of longitudinal ribs. This shell can be readily distinguished from any other heretofore described in this formation by its single, strongly marked varix.

Locality and position.—White limestone, Prairie Bluff, Alabama. Collection of the Academy.

CANCELLARIA.

CANCELLARIA ALABAMENSIS. Pl. 48, fig. 14. Shell wide; spire low; whorls four; mouth expanded; three or four folds on the columella.

Locality and position.—White limestone, Prairie Bluff, Alabama.

PURPURA, *Brug.* (MOREA, *Con.*)

P. (MOREA) NATICELLA. Pl. 48, fig. 15. Shell patulous; whorls four; mouth wide; surface marked by longitudinal ribs, crossed by lighter revolving lines. A cast. This species resembles *M. cancellaria*, *Con.*, but can be distinguished by its more elevated spire, and its more robust form.

Locality and position.—Brown marl, N. J. Collection of the Academy.

BULLA, *Klein.*

B. MACROSTOMA. Pl. 48, fig. 16. Shell subglobose; whorls two or three; mouth very wide; surface unknown; on the cast there are faint traces of longitudinal markings, probably lines of growth. A cast.

Locality and position.—White limestone, Prairie Bluff, Alabama. Collection of the Academy.

B. RECTA. Pl. 48, fig. 17. Shell small, subcylindrical; spire very much depressed; mouth nearly straight and narrow. A cast.

Locality and position.—Green marl, Burlington Co., N. J. Collection of the Academy.

MYSIA, *Leach.*

M. GIBBOSA. Pl. 48, fig. 18. Shell subglobose; beaks incurved; umbones prominent; anterior, basal and posterior edges regularly rounded; surface marked by prominent, concentric ridges.

Locality.—Delaware and Chesapeake Canal, and New Jersey. Collection of the Academy.

DIONE, *Gray.*

D. DELAWARENSIS. Pl. 48, fig. 19. Shell subquadrate; beaks small, slightly incurved; umbones small; cardinal line gently curved. The pallial impression has a deep sinus; shell marked by concentric lines.

Locality.—Delaware and Chesapeake Canal, and New Jersey. Collection of the Academy and my collection.

CARDIUM, *Linn.*

C. ABRUPTUM. Shell long, compressed, three-fifths as long as wide; beaks incurved and slightly bent anteriorly; umbones very prominent; umbonal ridge parallel with, and about one-third the width of the shell, from the posterior border; it extends to the base of the shell, becoming gradually rounded; anterior side rounded irregularly; base subangular at the extremity of the umbonal ridge; posterior side nearly straight; surface, anterior to the umbonal ridge, plain (?); posteriorly marked by six or more radiating ridges; hinge teeth large, anterior teeth larger than the posterior.

Locality.—"Near Purdy," Tenn. Prof. Safford.

This specimen, a cast sent me by Prof. Safford, although hardly perfect enough to figure, is so different from anything heretofore described, that I do not hesitate publishing it, since it cannot be mistaken.

CRASSATELLA, *Lam.*

C. MONMOUTHENSIS. Pl. 48, fig. 20. Shell subquadrangular; beaks curved anteriorly; umbones small; umbonal ridge prominent, angular and continued to the posterior basal angle; anterior side rounded, basal gently curved, posterior angular; muscular impressions well marked. This species resembles, somewhat, *C. vadosa*,

S. G. M., but is invariably smaller and differs a little in shape. The specimen figured is larger than the average.

Localities.—Monmouth and Burlington Cos., N. J. My collection.

C. DELAWARENSIS. Pl. 48, fig. 21. Shell subquadrangular; beaks and umbones small; umbonal ridge smaller than in the preceding species and rounded near the posterior end, slightly curved upwards toward the cardinal margin; muscular impressions deep; anterior edge rounded, basal gently sinuous, posterior subquadrangular (in the cast); shell concentrically striated.

This species differs from the preceding in being proportionally longer, in having smaller umbones, the umbonal ridge is smaller, more rounded, and loses itself towards the end in the general curve of the shell, while in *C. Monmouthensis* it continues uninterruptedly to the extreme edge of the shell, abruptly angular. There is besides in the cast of the present species, a small supplementary ridge on the cardinal side of the umbonal ridge, which is not found in the other species.

Locality.—Deep Cut, Delaware and Chesapeake Canal.

CARDITA, Brug.

C. SUBQUADRATA. Pl. 48, fig. 22, *a, b*. Shell subquadrate; beaks small, curved anteriorly; umbones broadly rounded; surface marked by about twenty compound, radiating ribs, each consisting of a broad rib, surmounted by a smaller ridge.

Locality and position.—Green marl, Burlington Co., N. J. W. Cleburne. Collection of the Academy and my collection.

LEDA, Schum.

L. PINNAFORMA. Pl. 48, fig. 23. Shell subtriangular; beaks incurved; umbones large, prominent; umbonal ridge small and faint; anterior side rounded, posterior acuminate, base broadly rounded; surface marked by numerous, prominent, concentric lines. The figure is twice the linear size of the specimen.

Locality and position —With the preceding. Collection of the Academy.

L. PROTEXTA. Pl. 48, fig. 24. Shell elongated, narrow, wider near the beaks; beaks small, posterior end long, narrow and apparently curved slightly upwards. A cast.

Locality and position.—With the preceding, and from Gloucester Co., N. J. Collection of the Academy.

CULTELLUS, Con.

C. CRETACEUS. Pl. 48, fig. 25. Shell elongated; beaks small and placed near the anterior end; basal margin regularly curved; anterior muscular impressions well

marked, posterior faint; there is the impression of a small fold at right angles to the hinge, placed just in advance of the beaks; it is shown in the figure. A cast.

Locality and position.—In Burlington Co., N. J., with the above. Collection of the Academy.

PECTEN, *Rondelet*.

P. BURLINGTONENSIS. Pl. 48, fig. 26. Shell discoidal, as broad as high, marked by numerous, irregular, concentric folds; ears nearly equal. A very fine cast.

Locality and position.—"Brown sand," Burlington Co., N. J. Collection of the Academy.

Prof. Safford has kindly sent me, for examination, a series of cretaceous fossils, collected by himself in connection with the geological survey of Tennessee. I have been able to identify but two new species, *Volutilithes Saffordi* and *Cardium abruptum*, nobis. The most interesting specimens besides these are two, a whole valve and part of another of *Trigonia thoracica*, S. G. M. These specimens are perfect in their markings, and show some important characters not heretofore published, and prove that it is *not* the same as *T. alceformis*, Sow., as Dr. Morton thought after having published it. I shall thus characterize it:—

TRIGONIA THORACICA, S. G. M. Pl. 47, fig. 10.

T. alceformis, Sow. sp., S. G. M., Jour. Acad., 1st series, Vol. 8. Inequilateral, truncated posteriorly, alated; obliquely ribbed, the most anterior ribs almost parallel with the lunule; ribs about seventeen, compressed laterally, nodulose except near the origin, where they are entire and sharp; edge deeply serrate, each process corresponding to one of the ribs; anterior end slightly truncated obliquely; lunule marked by a series of finely nodulated ribs, which point posteriorly; surface between the ribs marked by delicate lines of growth.

Locality and position.—"Ripley group," Tenn. This fossil has been also found in the Ripley group in Alabama, at Eufaula, Barbour Co., in the white limestone, Prairie Bluff, Alabama, and in the marls of New Jersey.

Remarks.—This beautiful species cannot be confounded with *T. alceformis* if we examine the relations of the ribs. In our species, except for the swell of the shell, they are straight. In the figure in Sowerby's Mineral Conchology the ribs are sinuous, twenty-six in number, thicker and not so nodulose. They are all nearly at the same angle with the lunule, which is nearly twice the width of that of *T. thoracica*. In this the most anterior ribs form a very acute angle with the lunule, and the ribs become more and more faint until the last is thread-like and hardly visible, while in the former species they are thick and robust to the extremity of the shell. An important difference is visible in the shape; the beak is proportionally smaller and

the edge much more serrate in this than in the former species. While *T. alæformis* is very elongated anteriorly, *T. thoracica* is obliquely truncated backwards. They both have a small plate inside the shell, near the anterior extremity, but it is smaller in *T. thoracica*. The anterior muscular impression in our species is rounded, quadrilateral, in Sowerby's it is crescentic, with the base up.

This shell also differs from *T. Emoryi*, Con., in the latter being more inflated, in having at least twenty-eight ribs, being proportionally more elongated anteriorly and its having a much wider lunule, and the ribs on the lunule inclining first anteriorly and then bending back, while in this species they have a backward inclination from their origin.

ART. X.—*Descriptions of New Species of Fossils, probably Triassic, from Virginia.*

BY WM. M. GABB.

CERATITES VIRGINIANUS. Pl. 48, fig. 27, *a, b, c.*

Shell discoidal, compressed; body whorl oval, enveloping one third of the preceding whorl; siphuncle in advance of the centre; surface marked by a faint row of tubercles on the ventral side, from each of which proceed two rounded waved ribs extending across the dorsum; between each pair of these ribs there is an intermediate one, equally prominent on the dorsum, but dying out before reaching the ventral side; there is also a faint rounded carina on the dorsum; these markings are so indistinct as only to be seen on good specimens; I have a specimen before me showing only the tubercles. Septum; dorsal lobe longer and narrower than the dorsal saddle, bifurcated, with three or four tooth-like processes on each side; inside of the bifurcation plain; dorsal saddle divided into three rounded processes, the middle a little the largest, (this varies a little at different stages, sometimes the lobes are all of the same size; this holds good in all the saddles of the same septum); superior lateral lobe smaller than the dorsal and divided into three branches, dorsal branch entire, terminal and ventral double; superior lateral saddle like the dorsal, but smaller; lateral lobe trifold, with each of the three branches bidentate; lateral saddle same as the others, but smaller; inferior lateral lobe nearly straight, but still preserving the trifold character; the remainder of the septum appears to consist of a mere undulation.

Locality and position.—Bath Co., Va., from a greyish rock, probably a limestone. Collection of the Academy, and my own collection.

PLEUROTOMARIA? Pl. 48, fig. 28.

A cast, too imperfect for description, but still interesting on account of the small number of molluscs found in this formation.

Locality.—Same as above. Collection of the Academy.

LEPTÆNA, N. S.

This small *Leptæna* I give for the reason given above. It is very imperfect; the ends of hinge line are broken off, and the specimen is so broken and compressed about the hinge as to show neither hinge nor area. The beak has been small and

slightly incurved; lower valve slightly convex and regularly curved from the beak to the basal margin, shell wider than long; hinge line apparently extended in a point behind the shell; surface marked by about fifteen rounded ribs crossed by concentric lines; the ribs cover about three-fifth of the shell, leaving one-fifth at each angle on both valves with only the concentric markings; upper valve slightly concave, very imperfect. The figure was inadvertently omitted by the lithographer.

Locality and position.—With the preceding.

RYNCHONELLA HALLI. Pl. 48, fig. 29, *a, b, c.*

Shell subtriangular, inflated; lower valve, beak moderately large, curved over the smaller valve, margin deeply sulcate, with a small rib in the centre of the sulcus, three ribs on each side; upper valve with two ribs in front, corresponding with the depression on the other valve, three lateral ribs, the upper one very faint; the ribs on both valves extend about half the width of the shell from the margin towards the beaks, leaving the upper half of the shell plain; surface marked by faint concentric lines (crossed by very indistinct radiating lines in one specimen; the others do not show this character.)

This shell, with the others, was found by my friend Mr. Conrad, several years ago, in Bath Co., Va. Mr. C. is not able to tell me their relation to the coal of Virginia, but from their locality they could not have been far from it. Further investigation will be necessary to determine whether they belong to a stratum above or below the coal. However, they are interesting, since they serve to add another link to the chain of facts that go to determine the age of this interesting deposit. The great probability is that they are Triassic. This view has been held for some time by Lyell, Rogers, Leidy and others. The genera above mentioned will not serve to restrict the age of this formation to the Trias. The genus *Ceratites* confines it to the Secondary group, but this genus is said to range to the top of the division. I have carefully examined, as far as I have been able, all the figures of so-called Cretaceous *Ceratites*, which the extensive library of the Academy would permit, and I have not yet seen a figure but what has shown a more or less complex septum. I have been no more successful with the Jurassic; still the evidence is only negative.

This *Ceratite* is the first American fossil that could be referred without doubt to this genus. If the *C. Americanus* of Harper should prove to be what, from the figure in the Proceedings of the Academy, it appears to be,—a weathered specimen of an *Ammonite*—then our species will be the first one found in America. I am inclined to this opinion the more strongly from the fact that I have before me a very much worn specimen of a *A. Delawareensis*, from Alabama, so nearly resembling the figure above quoted as hardly to be distinguished from it.

ART. XI.—*Reflections upon the nature of the Temporary Star of the year 1572.*
An application of the Nebular Hypothesis.

BY ALEXANDER WILCOCKS, M. D.

Among the curious appearances which are recorded in the annals of astronomy, none are more likely to awaken our deep meditation than the class of temporary stars.

The rarity of the phenomenon has left us but scanty observations upon which to found theories, but the advance made by science since the appearance of the star we are about to consider, enables us to supply from analogy some of its conditions which observation has failed to furnish.

To us, of this generation, the star of the year 1572 should be an object of especial interest, for if one theory held concerning it, viz.: that of its periodical nature, be the true one, persons who may witness its return have probably reached manhood.

Fortunately, this apparition occurred when the day of astronomical truth had dawned. Copernicus had lived, had published his book upon the revolutions of the heavenly bodies, and had died. By the light which his labors shed upon the mind of Tycho Brahe, he, the most eminent astronomer of his day, was enabled to determine all the facts that we have in relation to the star.

Let us quote the narrative of this eye-witness:

“On my return to the Danish Islands from my travels in Germany,” says Tycho Brahe,* “I resided for some time with my uncle Steno Bille, in the old and pleasantly situated monastery of Herrizwadt; and here I made it a practice not to leave my chemical laboratory until the evening. Raising my eyes, as usual, during one of my walks, to the well-known vault of heaven, I observed, with indescribable astonishment, near the zenith, in Cassiopeia, a radiant fixed star of a magnitude never before seen. In my amazement I doubted the evidence of my senses. However, to convince myself that it was no illusion, and to have the testimony of others, I summoned my assistants from the laboratory, and enquired of them, and of all the country people that passed by, if they also observed the star that had thus suddenly burst forth. I

* Comos, vol. iii., p 152.

subsequently heard that in Germany wagoners and other common people first called the attention of astronomers to this great phenomenon in the heavens; a circumstance which, as in the case of non-predicted comets, furnished fresh occasion for the usual raillery at the expense of the learned."

"The new star," Tycho Brahe continues, "was without a tail, and not surrounded by a nebula, and resembled in all respects the other stars, with the exception that it scintillated more than those of the first magnitude. Its brightness was greater than that of Sirius, α Lyræ, or Jupiter. For splendor it was comparable only to Venus when nearest to the earth, that is when only a quarter of her disk is illuminated. Those gifted with keen sight could, when the air was clear, discern the new star in the day time, even at noon. At night, when the sky was overcast, so that all other stars were hidden, it was often visible through clouds not unusually dense. Its distances from the nearest stars of Cassiopeia, which throughout the whole of the following year I measured with great care, convinced me of its perfect immobility. Already, in December, 1572, its brilliancy began to diminish, and the star gradually resembled Jupiter; but by January, 1573, it had become less bright than that planet. Successive photometric estimates gave the following results: for February and March equality with stars of the first magnitude; for April and May, with stars of the second magnitude; for July and August, with those of the third; for October and November, those of the fourth magnitude. Toward the month of November, the new star was not brighter than the eleventh in the lower part of Cassiopeia's chair. The transition from the fifth to the sixth magnitude took place between December, 1573, and February, 1574. In the following month the new star disappeared, and after having shone seventeen months, was no longer visible."

This star was first perceived by Schuler* at Wittemberg, on the sixth of August; it was seen at Augsburg on the 7th. It was observed by Cornelius Gemma on the 9th of November, and by Tycho on the 11th.†

Cornelius Gemma‡ had, on the 8th of November, particularly examined the part of heavens in which the star appeared, but did not see it. Tycho Brahe was sure the star was not visible half an hour before he saw it.§

What a commentary do these facts furnish upon the value of negative testimony.

Many hypotheses have been offered to explain the phenomena of this star. Tycho Brahe supposed it to be the result of a recent agglomeration of the matter diffused through space; in fact a new formation. What seemed to give weight to this conjecture was, that all the new stars mentioned by historians had been seen in the vicinity of the milky way.

* Prof. O. M. Mitchel, "Planetary and Stellar Worlds," p. 293.

† "Gallery of Nature," p. 167.

‡ "Principia," lib. 3.

§ "Herchel's Outlines of Astronomy," chap. 16.

Certain astronomers refused to adopt the views of Tycho Brahe from scholastic and religious scruples. These maintained that the star was as ancient as the world itself, but had not been seen because of its distance. Having approached the earth, it had become visible; and again receding, it had been lost to our sight. Its path in both instances was a straight line, as its position among the other stars did not vary.

Tycho opposed this hypothesis with an objection which he considered conclusive, viz.: that motion in a right line was not natural to the heavenly bodies.

The star of the year 1572 differed from all the other stars called temporary, in that, on two former occasions, stars had appeared for a time near the same point in the heavens. The first of these was in the year 945; and the second in 1264; and both were seen between the constellations of Cepheus and Cassiopeia.

Even while the star of 1572 was shining, it was considered to be identical with those of 945 and 1264. This view has been adopted by Keill, Pigott and Goodricke, and reduces it to the class of the variable or periodical stars.

The views held by Sir Isaac Newton upon the subject of this star were bold, but purely conjectural. He says: "Fixed stars that have been gradually wasted by the light and vapors emitted from them for a long time, may be recruited by comets that fall upon them, and from this fresh supply of new fuel, these old stars, acquiring new splendor, may pass for new stars. Of this kind are such fixed stars as appear on a sudden, and shine with a wonderful brightness at first, and afterwards vanish by little and little. Such was that star which appeared in Cassiopeia's chair in 1572."*

De Maupertuis, whose opinion in his day had some weight, entertained the following views upon the subject of the variations of the stars. He conceived that, owing to a great centrifugal force, some stars had taken the form of circular disks, which, when their faces were turned towards the earth, were seen in all their brightness; but which were but little seen, if at all, when the edge of the disk was turned toward the earth. The changing of the plane of the disk, he imagined might be owing to the perihelion passage of a huge planet, or a comet, with an orbit which was very elliptical and highly inclined to the plane of the star's equator.†

In undertaking to explain the cause of a phenomenon of unusual occurrence, it should be the aim of the theorist to do so in conformity to laws whose existence is ascertained. And if it be necessary to assume conditions not known to exist, it is indispensable to exclude such as violate established principles.

The objection to the views of Tycho Brahe are, that they have no independent basis, they are supported neither by analogy nor by observation, and are in fact mere surmise. They have, however, this claim to our consideration, that they present many points of resemblance to those adopted by the elder Herschel.

*Principia, lib. 3.

†De Maupertuis, "De figuris Astrorum," Paris, 1734, or Tegg's edition of the "Principia," with commentaries by Le Seur and Jaquier, London, 1833, vol. ii, p. 197, Note 174.

The explanation offered by the schoolmen of Tycho's day was rejected by that astronomer upon ground already stated.

Upon this point Arago remarks, "that the phenomena did not imply motion in a line mathematically straight; for by substituting a highly elliptical orbit for the straight line, its conjugate axis might have been small enough to escape observation from the earth. Tycho's objection had therefore no force."

Arago further says: "If the Astronomers of the time of Tycho had understood the velocity of light, and had been able in their observations upon parallax, to practice the precision of which the moderns justly boast, they would from the hypothesis of a change of distance, considered as a means of explaining the variations of the intensity of the star of 1572, have drawn conclusions, before which, in my opinion, the most daring would have recoiled. The reader shall judge."

"The star of 1572 being in the region of the other stars, its distance from the earth must have equalled at least that, over which light could travel in three years."

"At the time of its sudden apparition, and for several months afterwards, the new star surpassed in brilliancy the other stars of the first magnitude. For a star of the first magnitude to become one of the second, by receding from the earth, it must (as has been proved, Chap. 5, p. 361,) double its primitive distance. Thus the star of the first magnitude of 1572 could not have faded to the second rank without having at least receded the distance over which light could travel in three years."

"Six years at least must have elapsed between the last day of the period in which it shone in its full splendor, and the day when it should first appear of the second magnitude, even if the velocity of the star equalled that of light."

"Three years would have been acquired for the star to pass from its position in the first rank, to that in the second, and three years for its light to pass from the second position to the first."

"Under the supposition that the star retains the same velocity, the transition from the second magnitude to the third, would have required an interval of six years, and so on to the seventh magnitude."

"In short, the star of the middle of November, 1572, receding from the earth with the velocity of light, could not pass from one magnitude to another, by means of its increased distance, in less than six years; it would have required thirty-six years to descend from the first to the seventh magnitude."

"Let us compare these calculations with the results of observation."

"In March, 1573, the new star in Cassiopeia was still of the first magnitude."

"One month later, in April, 1573, it had already descended to the second magnitude."

"To explain so rapid a variation of intensity by a simple change of distance, it is vain even to give the star a velocity greater than that of light; for example, with an

infinite velocity. This last supposition itself would only lessen by half the result of our calculations.”*

There is certainly a fallacy in the reasoning of Arago. If a luminous body were to dart off from an observer with the velocity of light, it should become instantly invisible, saving only the time required for the light already emitted to reach his eye. This position is advanced on the following grounds: the velocity of the body, being equal to that of light, and in the opposite direction as regards the observer, it should neutralize the motion of the light, and nullify its effect.

This argument may fail to convince some persons, and they will be assisted by a further elucidation.

Let us suppose a non-luminous body at rest in space, and in the midst of darkness. Near the body is a being, capable of perceiving the impression of light. Suddenly the body becomes luminous, and darts its rays into space, at the rate of 192,000 miles in a second. At the same instant, the being darts off at the same velocity, but always keeps in advance of the light. Will any one assert that the being will see the light? Certainly he cannot, for he is always beyond the sphere of its visibility.

Let us now suppose a case in which the motion is changed conversely. When the body becomes luminous, it darts off itself with the velocity of light, leaving the observer at rest. He cannot see the light, for he too is beyond the sphere of its visibility. The light does not advance in his direction, because the centre from which it is eliminated recedes at the same rate as the light leaves it, and the observer must remain in darkness.†

This case differs from the one proposed by Arago, inasmuch as in the latter the star was not supposed to become *suddenly* luminous; and *his* observer was so distant, that light could only reach him in three years. In that case, the star should be seen for three years, and then be extinguished.

With regard to the hypotheses advanced by Sir Isaac Newton and de Maupertuis,

* *Astronomie Populaire*, vol. i., pp. 418, and seq.

† A learned friend, who puts no faith in the corpuscular theory of light, dissents from the doctrine embodied in this argument, and agrees with Arago so far as to believe that an undulation of light will be propagated through the ether, with a velocity which is absolute with reference to space, and does not respect the motion of the body from which it emanates. By a singularly ingenious mode of reasoning he arrives at a conclusion identical with that which we have reached ourselves.

The number of undulations to a second in the extreme violet ray is 727,000000,000000; in the extreme red ray 458,000000,000000. If the luminous body recede from the observer, the number of undulations in a second must diminish in the inverse ratio of the motion of the body, the velocity of light being unity.

If, therefore, the star recede with the velocity of light, the number of undulations of the extreme violet ray will be reduced to 363,500000,000000, which is below the number of the extreme red. Consequently the star should make no impression upon our visual organs.

This argument is the more interesting as it is the direct offspring of the undulatory theory of light, the reasoning in the text being more nearly allied to the corpuscular theory. As in many other instances, the two theories lead to like results.

it must be observed, that if they had been informed of the small amount of matter contained in comets, the former would not have imagined that, by their falling upon an extinguished sun, its glory could be restored; and the latter would not have supposed that the plane of rotation of a sun could be changed by so insignificant an object as a comet.

Sir Wm. Herschel held the opinion that a cosmic cloud lay in the region between Cassiopeia and the earth, and that the temporary star had been obscured by an opaque portion of the cloud.

The great La Place thus expresses himself on the subject of this star:

“As to those stars which appear almost suddenly with great brightness, and then disappear, we may suspect with reason that great conflagrations, occasioned by extraordinary causes, have taken place upon their surfaces. This suspicion is strengthened by a change in their color, analogous to what occurs upon our own planet, in bodies which, having become incandescent, subsequently undergo extinguishment.”*

Von Humboldt offers no theory of his own to account for the phenomena of the star of 1572. He merely surmises, “that the apparition of new stars, as well as the variations of the periodical stars, might be owing to an electro-magnetic process of their photospheres. This may occur once or periodically. The electrical processes of light on our earth manifest themselves either as thunderstorms in the regions of the air, or as polar effluxes, and exhibit a certain periodicity.”†

Much as we venerate the name of the great philosopher who suggested this analogy, we must avow our inability to trace the similarity between the case of a star shining uninterruptedly for seventeen months, and that of atmospheric electricity, a flash of which, according to Sir Charles Wheatstone, does not last the one thousandth part of a second. Nor do we see much resemblance between the light of a star visible at noonday, and that of the polar effluxes, which requires that twilight should fade into darkness ere their feeble flames can be perceived.

Arago, like Von Humboldt and Sir John Herschel, does not undertake to explain the variations of this star by any special theory. He notices those offered by the philosophers who had preceded him, and points out their fallacies. The only positive opinion which he gives upon the subject is, that the star during the period of its visibility must have undergone great physical changes.‡

The doctrine of axial rotation, which has been adopted by many of those who believed in the identity of the stars of 945, 1264 and 1572, to explain its periodicity, brings with it these difficulties: 1st. That it is impossible to illuminate the surface of a sphere in such a way, as that, by rotating at a uniform rate, it can be visible only

*Système du Monde, p. 54.

†Cosmos, vol. iii., chap. 4.

‡Astronomie Populaire, vol. i., p. 425.

seventeen months out of more than three hundred years; and 2d. That a uniform rate of rotation should produce a uniform interval between the apparitions of the star.

Keill and Pigott adopted a period of about one hundred and fifty years for the star, instead of three hundred, which Arago says, "without raising new difficulties, has the advantage of assimilating the period somewhat to those of the other variable stars."*

It is not easy to coincide here with the great French astronomer, for a question which instantly arises, viz. : why was not the star seen in 1095, 1414 and 1722? cannot be answered.

We have now examined the views of the most eminent writers upon the subject of this wonderful star, from the period of its apparition to the present time, but unfortunately the hypotheses which are sufficient to explain the cause of its sudden appearance and subsequent extinguishment have not the support of analogy; and the theories which have been based upon conditions known to exist are not sufficient to explain the phenomena.

Let us now ask, may we not learn some important truths with regard to this star, by a direct interrogation of nature? Surely the well established laws of motion can yield us some light.

Let us first inquire, does this body move?

In view of the universal distribution of matter, rest is an astronomical impossibility. It may therefore be confidently affirmed that the star of 1572 does move.

If it move, does it do so in a straight line?

The distribution of matter would compel a negative answer to this enquiry.

What, then, is the nature of its motion?

Our acquaintance with the movements of the heavenly bodies permits but one answer to this question, viz. : that the star moves in one of the conic sections, about a point which is a focus common to it and some other body of space.

Thus far do we advance under the guidance of inexorable necessity. As we progress, we shall discover that we have already obtained data which will account for one of the minor phenomena of the star, for which an explanation has never been proposed.

As far as the requirements of the views we are about to offer go, it matters not which of the conic sections we assume to be the one in which the star moves; but for the sake of simplicity, and for convenience of demonstration, we will suppose that it moves in a circle, and that the plane of its orbit is not at right angles with the visual ray connecting it with the earth.

*Astronomie Populaire, vol. i., p. 414.

Having now obtained a foundation based upon astronomical necessity, let us ask, has there ever been conceived an hypothesis designed to account for cosmical phenomena more important, and more thoroughly explored, than those pertaining to this star, and which, when applied to the latter, may yield an explanation?

We answer, yes. The Nebular Hypothesis of La Place was designed for such a purpose, and having for half a century stood the fire of the world's criticism, has passed that ordeal unscathed, and now holds an almost undisputed empire upon the minds of astronomers.

Meditating upon the relations which the different bodies of the solar system bear to each other, with the view of arriving at the probable cause of the same, La Place directed his attention to the following phenomena.*

1st. The uniformity in the direction of the orbital motion of the planets, and the near coincidence of their planes.

2d. The conformity in the direction of the axial rotation of the sun and planets, to the orbital motion of the latter, and the slight difference of the planes.

3d. The small eccentricity of the orbits of the planets and their satellites.

Finally the great eccentricity of the orbits of the comets.

La Place was influenced in his reflections by the telescopic appearance of certain stars noticed by Sir Wm. Herschel, which seemed to be in various stages of progress towards completeness.

The views which he was led to adopt, after severe study, were the following :

1st. The primordial condition of the sun was that of a nebula of extreme tenuity, having a revolution upon its axis.

2d. By the gravitation of the particles of the nebula, a condensation occurred at its centre.

3d. At this period the sun was in the condition of those telescopic stars which are observed to consist in a nucleus, surrounded by a nebulous haze.

4th. The contraction of the matter caused such an increase of the angular velocity at the surface of the nebula, that, by the centrifugal force, the particles about the equator were separated from the mass, and left in the form of a ring.

5th. The formation of rings occurred at successive epochs, and eventually became planets.

6th. It was within the range of possibility that a ring should continue unbroken, or that it should separate into many fragments. The solar system furnishes examples of each of these extremes.

The views which we shall offer require the mean of the extremes proposed by La Place, viz. : that of a ring with a single solution of continuity.

We have no occasion to follow the nebular hypothesis further. We propose that the star of 1572 was in the condition just described, viz. : its matter so much condensed as to have a brilliant disk. Its body surrounded by a ring of opaque nebulous matter, the ring having one opening, and revolving round the star in about three hundred years, in a plane which passes through the solar system. The star and the ring revolving about a distant focus in some unknown period of time.

We have now to determine what phenomena should characterize a celestial body thus constituted, and by comparing the result with the appearances presented by the star of 1572, to decide upon the competency of the nebular hypothesis to explain its mysteries.

That an opaque ring revolving round a luminous body should conceal the same from the inhabitants of a world lying in the plane of the ring, is a truth so plain as to require no demonstration.

Equally palpable is it, that an opening in the ring should reveal the star to observers, when the opening coincided with a line from the observers to the star.

If we choose to believe that the nebulous matter composing the ring is possessed of the power to refract light, the passage of a ray through the margin of the opening should give a succession of colors to the star, before the interposition of the denser portion of the ring caused its entire disappearance.

Such a phenomenon did characterize the star of 1572; its rays being tinged with the three primary colors, occurring (as reported) in nearly the reverse order of their repangibility, viz. : yellow, red,* and finally faintly blue.†

The nebular hypothesis does not enlighten us as to any reason for a ring performing its revolutions in unequal periods of time; while it is a noted fact that between the three apparitions of the supposed identical star, the intervals differed eleven years.

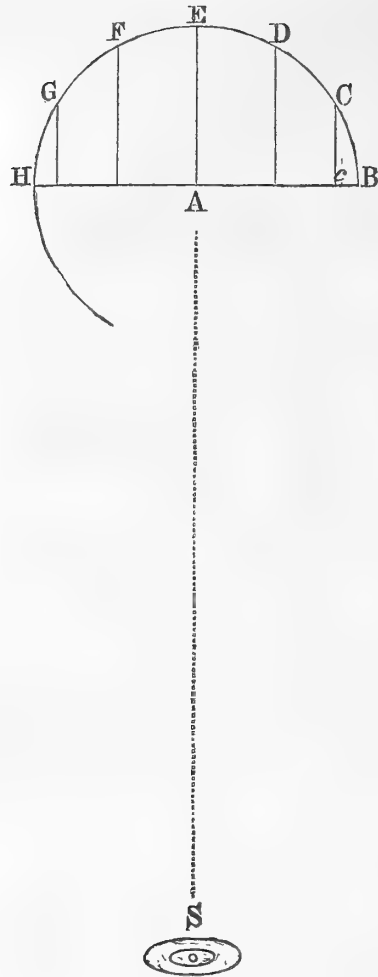
We must, therefore, look elsewhere for the cause of this inequality. We find it in that part of the conditions of the star which we derived from astronomical necessity, viz. : its revolution about a distant focus.

With this condition for a basis, and the measurable velocity of light as a modifying influence, a mathematician could, by the use of the symbols for unknown quantities, and an easy calculation, show the necessity for the apparitions of such a body occurring after unequal intervals.

But for our purposes it will be more convenient, and will make a stronger impression upon the understanding, if we endow the various measures of time and space, with coefficients which are significant of real quantities.

*Astronomie Populaire, vol. i., p. 425

†Planetary and Stellar Worlds, p. 293



Thus, if S be the solar system and A the focus about which the star revolves, A B will represent the radius of its orbit, and shall be equal to the distance over which light travels in one unit of time.

A is at rest with respect to the solar system, and all parts of the line H, A, B being nearly equidistant from S, we may neglect altogether the time occupied by light in passing from A to S.

We will suppose that the ring makes a revolution round the star in ten units of time, and in the same period the star advances thirty degrees in its orbit.

The points B, C, D, E, F, G, H represent positions of the star at the moments when the opening in the ring is in a line with the star and the earth.

Let us suppose the star at B; it is visible, but the revolution of the ring soon hides it from the inhabitants of the earth, and the star and the ring advance toward the position C. This being reached, the opening in the ring is again in a line with the star and the earth.

It is manifest that in gaining the position C, the star has receded from the solar system, and is further than it was at B, by the distance Cc, the

sine of B C, an arc of 30° . Its light must travel over Cc in addition to A S. The star is invisible, therefore, during a period consisting of the time of revolution of the ring, and that required by its light to travel over the sine of 30° of its orbit.

The revolution of the ring requires 10. units, the journey of the light over the sine of 30° , .500 The star will be hidden 10.500

But in its progress from C to D, the star does not recede from the earth as much as while passing from B to C, because the sine of 60° is not double that of 30° .

The sine of 60° is .867 from which deduct the sine of 30° .500 and add 10. for the revolution of the ring, and we have $.867 - .500 = .367 + 10. = 10.367$ the period the star will be invisible while passing from C to D.

We obtain the next period by deducting sine 60° from the radius, and adding 10. for the revolution of the ring. $1. - .867 = .133 + 10. = 10.133$

Thus while passing through the portion of its orbit between B and E, the star will be hidden successively periods of 10.500 10.367 and 10.133

To carry the star through the second quadrant of its orbit, we should, upon the

principle just illustrated, deduct from the time of revolution of the ring, that required by the light to pass over a portion of the sine of the arc through which the star has advanced. We should then find its apparitions occurring at still decreasing intervals, viz., 9.867 9.633 and 9.500

The following table exhibits the periods of the star for each of its terms of invisibility through its whole orbit, beginning at the point B, and following the letters in their natural order :

10.	+	.500	=	10.500
10. + .867	—	.500	=	10.367
10. + 1.	—	.867	=	10.133
10.	—	.133	=	9.867
10.	—	.367	=	9.633
10.	—	.500	=	9.500
10.	—	.500	=	9.500
10.	—	.367	=	9.633
10.	—	.133	=	9.867
10.	+	.133	=	10.133
10.	+	.367	=	10.367
10.	+	.500	=	10.500

The apparent inequality of its periods is thus accounted for, which is the minor phenomenon alluded to as one never explained.*

* A few words upon the bearing which these views have upon some stars presenting kindred phenomena to that of 1572.

To apply the ring hypothesis to the star seen by Jansen in the Swan in 1600, and by Dominique Cassini in 1655, and subsequently by Hevelius in 1665, we must suppose that its nebulous ring contains several openings, which were successively in a line between the star and the earth at those epochs ; or rather that its one grand hiatus is occupied by detached masses of nebulous matter, which revolve in the plane of the ring.

The doctrine of revolution about a distant centre explains with singular felicity the variations of period and intensity of the star Omicron in the constellation of the Whale, (sometimes called *Mira Ceti*.) "It appears about twelve times in eleven years, or more exactly in a period of 331 d. 15 h. 7 m. ; remains at its greatest brightness about a fortnight, being then, on some occasions, equal to a star of the second magnitude, decreases during about three months, till it becomes completely invisible to the naked eye, in which state it remains about five months, and continues increasing during the remainder of its period. Such is the general course of its phases. It does not always, however, return to the same degree of brightness, nor increase and diminish by the same gradations, neither are the successive intervals of its maxima equal. From the recent observations and inquiries into its history by M. Argelander, the mean period above assigned would appear to be subject to a cyclical fluctuation embracing eighty-eight such periods, and having the effect of gradually lengthening and shortening alternately those intervals to the extent of twenty-five days, one way and the other. Vide "*Herschel's Outlines*," Chapter 16.

If the cause of these inequalities be owing to the conditions we have proposed, then the twenty-five days alluded to in Sir John Herschel's account, represent the time required by light to pass over the diameter of the star's orbit, which is, therefore, equal to seventy-five times that of the planet Neptune.

Should observation establish that the star varies in right ascension and declination in a period corresponding to the above cycle, the determination of the amount of the displacement would give us the only datum wanting to enable us to calculate the distance of the star from the earth. This could then be done with much more accuracy than can be accomplished with its yearly parallax as a basis.

Who will gild his name by this achievement?

We trust these remarks will justify the conclusion that the Nebular Hypothesis explains the phenomena of the star of 1572 better than any theory ever offered. Should such be the verdict, it gives a breadth to this celebrated scheme beyond what was designed for it by its illustrious founder.

ART. XII.—*Descriptions of new birds of Western Africa, in the Museum of the Academy of Natural Sciences of Philadelphia.*

By JOHN CASSIN.

1. MEROPOGON BREWERI, Cassin.

Meropogon Breweri, Cassin, Proc. Acad. Philada., 1859, p. 35.

PLATE XLIX. Fig. 1.

Large, bill curved, much compressed, wing moderate or rather short, first quill shortest, third and fourth longest and nearly equal, tail rather long, the two middle feathers lengthened beyond the others and attenuated to the end, other tail feathers abruptly truncate and emarginate at their tips; legs short, toes rather long, flattened beneath, outer and middle toes united to the second joint, inner and middle toes united to the first joint. Feathers of the throat and neck in front lengthened and beard-like, plumage rather lax and soft. Total length about $13\frac{1}{2}$ inches, wing $4\frac{3}{4}$, tail $7\frac{1}{2}$, bill from corner of mouth direct to tip of upper mandible, 2 inches, tarsus $\frac{6}{10}$, middle tail feathers $7\frac{1}{2}$, outer tail feathers $4\frac{1}{2}$ inches.

Head glossy black, back, wings and middle tail feathers fine green, nearly uniform or with a slight yellowish tinge on the back. Under parts fine reddish fulvous with a tinge of green and yellow in the middle of the abdomen, under wing coverts light rufous. A transverse band of dark chestnut on the breast immediately next to the black plumage of the neck. Quills green on their upper surface, with their shafts black, inner edges of primaries black, of secondaries and tertiaries rufous. Two middle tail feathers and outer web of outer tail feathers green, with their shafts black, others fine dark reddish chestnut (or *marron*) tipped with green. Bill black, feet probably light colored. Sexes alike.

Hab.—Countries on the Camma and Ogobai Rivers, Western Africa. Specimens in Mus. Acad., Philadelphia.

This is one of the most remarkable birds of the Family *Meropidae*, and seems to combine characters of several genera. It appears to belong properly to the genus *Meropogon*, Bonaparte, Consp. Av. i. p. 164, having much the aspect and characters of *Mellitophagus* with the lengthened or beard-like feathers on the throat and neck of *Nyctiornis*, though not so distinct, nor so long, in the present specimens, as is usual in

that genus (*Nyctiornis*). The bill is rather large, much curved and compressed, and the middle tail feathers prolonged and tapering, tail rather wide and truncate. This bird is easily distinguished by its black head, which color terminates abruptly on the breast, and is succeeded by a band of dark chestnut, not very well defined but readily observed. It is nearly as large as *Nyctiornis amictus* or *N. Athertoni* of Asia, and is the largest species yet known of African *Meropidae*.

In Cabanis' *Journal für Ornithologie* for 1859, p. 433, Mr. F. Heine, a talented young naturalist, son of the distinguished proprietor of the large private ornithological museum of which Cabanis' Museum Heineanum is a catalogue, proposes for this species the new generic name *Bombylonax*. It is not stated by him that he is acquainted with either Bonaparte's *Meropogon* or with my *M. Breweri* here described, and I presume that he is not with the latter, as he copies my descriptions literally. His proposition is therefore scarcely to be regarded as founded on sufficient information, and though possibly correct, is provisional and conjectural only.

It is with great gratification that I name this handsome bird in honor of my talented and faithful friend Thomas M. Brewer, M. D., of Boston, one of the most distinguished of the ornithologists of the United States. Several specimens are in the Museum of the Academy, all of which were purchased from Mr. P. B. Du Chaillu, and were stated by him to have been obtained on the Ogobai River, Equatorial Western Africa.

2. MEROPISCUS MÜLLERI, Cassin.

Meropiscus Mülleri, Cassin, *Proc. Acad. Philada.*, 1857, p. 37.

PLATE XLIX. Fig. 2. Male.

Rather larger than *M. gularis*. Bill long, curved, culmen distinct, wing moderate, first quill short, fourth longest, tail moderate or rather long, nearly truncate or slightly rounded; feet weak, tarsus short.

Total length about 8 inches, wing $3\frac{1}{2}$, tail $3\frac{1}{2}$ inches.

Throat with a few red feathers, probably in fully adult, bright scarlet. Head and entire under parts of body fine blue, lighter and inclining to green in front and over the eyes. Auricular spots black. Back and wings reddish chestnut, brighter on the back and becoming brownish on the primaries. Tail above blue with the inner webs of the outer feathers black and the same color on its under surface (black). Under wing coverts dull rufous chestnut. Bill and feet dark colored.

Hab.—Country on the River Muni, Western Africa. Specimen in Mus. Acad. Philada.

One specimen only of this curious and handsome species is in collections purchased for this Academy from Mr. P. B. Du Chaillu, and is stated to have been obtained at the locality above given. It is a true *Meropiscus*, rather larger than the now well known

M. gularis of Western Africa, and strictly of the same generic form, but its colors are quite different.

This bird is named in honor of the Baron John William Von Müller, distinguished for his Zoological Researches in Africa, and a liberal contributor to the Museum of this Academy.

3. MUSCIPETA DUCHAILLUI, Cassin.

Muscipeta Duchailui, Cassin, Proc. Acad. Philada., 1859, p. 48.

PLATE L. Fig. 1, 2. Male and female.

Resembling in form and colors *Muscipeta paradisea* of Asia, and also *M. mutata*, *holosericea* and *Ferreti* of Africa, and about the size of the last three species. Middle feathers of the tail long, others graduated, head crested, bill wide, somewhat depressed, bristles at the base of both mandibles long and conspicuous, wing moderate, fifth quill longest, male and female quite different in colors.

Male, adult. Back, rump and upper tail coverts *reddish chestnut*, head and neck shining greenish black, abdomen dark cinereous. Quills brownish black, greater wing and tertiary quills widely edged with white, forming a very conspicuous longitudinal stripe of white on the wing, under wing coverts dark ashy (same as the abdomen), middle tail feathers white, with their shafts black at base, outer tail feathers brownish black, several of the longer edged with white on their inner webs.

Female, adult. Back, rump, upper tail coverts and tail *snowy white*, the shafts of the tail feathers for about half the length of the middle feathers and throughout the others, black. Crested, head and breast shining black (as in the male), abdomen and under tail coverts white, the former mixed and striped with black on the flanks, quills brownish black, greater coverts and outer edges of tertiaries white, under wing coverts white. Bill and feet in both sexes ashy bluish brown. Young male. Upper parts white as in the female, but with longitudinal stripes of black, outer tail feathers brownish black edged with white, abdomen dark ashy nearly black.

Total length about 14 inches, wing $3\frac{1}{2}$, tail 10, middle feathers exceed the others by about 6 inches.

Hab.—Camma River, Western Africa. Spec. in Mus. Acad., Philadelphia.

In general characters and appearance this bird resembles the well known *Muscipeta paradisi*, and like that species the male is chestnut colored on the upper parts of the body and the female is snowy white. This bird has also relations to *M. mutata*, and others of Southern and Eastern Africa, but is quite different specifically, though strictly congeneric and of the same general form. It is one of the most handsome species of Flycatchers yet known to inhabit Western Africa.

Several specimens in the museum of the Academy were purchased from Mr.

P. B. Du Chaillu, who obtained them on the Camma River, in Equatorial Western Africa.

4. *MUSCIPETA SPECIOSA*, Cassin.

Muscipeta speciosa, Cassin, Proc. Acad. Philada., 1859, p. 48.

PLATE L. Fig. 3. Male.

Resembling *Muscipeta melampyra*, but is smaller with the tail long and having a white longitudinal stripe on the wing like *M. melanogastra* and *M. rufiventris*. Two middle feathers of the tail much the longest, others graduated, wing moderate, fifth quill longest, bill stout, rather wide and thick, but not so long as usual in this genus, bristles at base of both mandibles conspicuous. *Upper tail coverts* in adult, glossy black. Head, neck and breast glossy black with a green lustre, abdomen and under tail coverts dark bluish ashy or nearly black, wing coverts and quills black, greater wing coverts widely edged with white, secondary quills widely edged externally with white, (forming a conspicuous white spot on the wing coverts, continued in a longitudinal stripe on the quills). Under wing coverts dark ashy, nearly black, same as the under parts of the body.

Upper parts of body fine rufous chestnut, shorter quills edged with the same. Tail rufous, rather lighter than the back, all the feathers edged towards the end with brownish black and the middle feathers brownish black along their shafts and tipped with the same. Bill and feet black.

Total length about 9 inches, wing $3\frac{1}{2}$, tail 6, middle feathers of the tail exceed the next pair about $2\frac{1}{2}$ inches, bill from gape $\frac{3}{4}$ inch.

Hab.—Camma River, Western Africa. Spec. in Mus. Acad., Philadelphia.

This is a species of the same general appearance as *M. melanogastra*, *rufiventris* and others, and resembling in colors, especially of the under parts of the body, *M. melampyra* as stated above. In that species (*M. melampyra*), the under tail coverts are bright rufous, and it has no white stripe on the wing. In the bird now described the under tail coverts are dark ashy, exactly the same as the abdomen and the white spot and stripe on the wing are very conspicuous. The upper tail coverts, especially the longest of them next to the tail, are lustrous greenish black in the present bird, which character distinguishes it from all other species with which I am acquainted. The only other African *Muscipeta* which has the under tail coverts dark cinereous, appears to be *M. senegalensis*, Lesson, a species that I do not know, but it is not, according to the description, much like the present bird.

A single specimen only, which is in adult plumage, is in the Museum of the Academy. It was purchased from Mr. P. B. Du Chaillu, who obtained it on the Camma River, Western Africa.

5. *TROCHOCERCUS NITENS*, Cassin.

Trochocercus nitens, Cassin, Proc. Acad. Philada., 1859, p. 50.

PLATE L. Fig. 4. Male.

Of the same generic group as *Muscicapa cyanomelas*, Vieillot, LeVaill. Ois. d'Afr. iv. pl. 151, but not intimately resembling that species. Crested, feathers of the crest somewhat spatulate and presenting a distinct imbrication, bill rather strong, bristles at the base of both mandibles strong and nearly as long as the bill. Wing moderate, first quill short, fourth and fifth longest, tail rather long, graduated, legs and feet weak but longer than in *Muscicapa* or *Muscipeta*.

Total length about $5\frac{3}{4}$ inches, wing $2\frac{1}{2}$, tail 3 inches; ♀ smaller.

Male. Head, breast, and entire upper parts of body, glossy bluish black, which is also the color of the wings and tail, abdomen and under tail coverts light cinereous, very pale and nearly white next to the black color on the breast, under wing coverts white, bill and feet bluish.

Female. Top of the head (or crest) only, glossy black as in the male, back and other upper parts dark cinereous, without lustre, wings and tail ashy black. Entire under parts light cinereous, darker on the throat and breast and very pale on the abdomen, under wing coverts light ashy, nearly white. Rather smaller than the male.

Hab.—Country on the River Camma, Western Africa. Specimens in Mus. Acad. Philadelphia.

This is a second species of the same group as *Muscicapa cyanomelas*, LeVaill. Ois. d'Afr. iv. pl. 151, as stated above. It is a very strongly marked and distinct species with very simple colors, entirely without the white scapulars and tertiaries which so strongly mark that bird, and are well represented in LeVaillant's plate, above cited. The sexes differ in colors as described above, and specimens which I suppose to be young males resemble the female.

Several specimens of this interesting little bird were purchased from Mr. P. B. Du Chaillu, who states that he obtained them on the Camma River in Equatorial Western Africa.

ART. XIII.—*New Unionidæ of the United States and Northern Mexico.*

By ISAAC LEA, LL. D.

Since the publication of my exotic paper in the last part of the Academy's Journal, I have procured many new indigenous species, and a few from Northern Mexico. I now return to them, having made full descriptions of their outward forms; and when I had the advantage of having the soft parts, I have carefully made examination of them and given their characters. It is to be regretted, however, that the living animals can rarely be obtained of new species. The drawings will be found to be made with great care and their natural characters carefully preserved.

UNIO DISPAR. Pl. 51, fig. 153.

Testâ lævi, ellipticâ, subinflatâ, ad latere paulisper planulatâ, valdè inæquilaterali, posticè obtusè angulatâ, anticè rotundatâ; valvulis subcrassis; natibus prominulis, ad apices undulatis; epidermide vel luteâ vel olivâ et valdè radiatâ; dentibus cardinalibus parvisculis, compressis, erectis, crenulatis, in utroque valvulo duplicibus; lateralibus longis, lamellatis curvisque; margaritâ albâ et iridescente.

Shell smooth, elliptical, somewhat inflated, a little flattened at the sides, very inequilateral, obtusely angular behind and rounded before; valves rather thick; beaks a little prominent and undulate at the tips; epidermis yellow or olive and very much rayed; cardinal teeth rather small, compressed, erect, crenulate and double in both valves; lateral teeth long, lamellar and curved; nacre white and iridescent.

Proc. Acad. Nat. Sci. 1860, p. 305.

Hab.—Columbus, Georgia. Bishop Elliott and G. Hallenbeck.

My cabinet and cabinets of Bishop Elliott and G. Hallenbeck.

Diam. .7,

Length 1.2,

Breadth 2.2 inches.

Shell smooth, elliptical, somewhat inflated, a little flattened at the sides, very inequilateral, obtusely angular behind and rounded before; substance of the shell rather thick; beaks a little prominent, with numerous small undulations at the tips; ligament rather short, thin and light brown; epidermis yellow, varying to olive, radiated all over the disk, but most strongly on the posterior portion; umbonial slope slightly raised and rounded; posterior slope somewhat carinate, and covered with dark green rays; cardinal teeth rather small, compressed, erect, crenulate and double in both valves; lateral teeth long, lamellar and curved; anterior cicatrices distinct and well impressed; posterior cicatrices confluent and slightly impressed; dorsal cicatrices placed nearly in the centre of the cavity of the beaks; cavity of the shell rather shallow and wide; cavity of the beaks shallow and subangular; nacre white and very iridescent.

Remarks.—I have a number of specimens of this species before me, many of which differ in several phases. When I first received part of them some two years since, I considered them a variety of *subellipsis* (nobis), but there are several characters which separate it from that species. It is smaller and is more disposed to being nearly straight on the basal margin. It has also a peculiarity in nearly all the specimens of having very faint rays on the sides and on the anterior portion, while the posterior portion has larger, greener and more closely set rays. The rays are usually wavy, and sometimes consist of a bundle of capillary lines. Most of the specimens are more or less sulcate on the anterior slope. The females are smaller than the males, and are enlarged on the umbonial slope, somewhat like *rutilans* (nobis). Only one of the specimens was perfect enough to observe the character of the undulations on the tips, and these were small, numerous and very regular.

In outline it is very near to *intercedens* (nobis), but not so regularly elliptical, and that is a smaller species and usually purplish or salmon colored in the nacre, while this is always white, at least I have never seen it of any other color.

I have not had the opportunity of examining the soft parts of this species, but Mr. Hallenbeck informs me that he examined a female in October. He says that "the posterior half of the branchiæ was well filled with young. It was white and exhibited the ribbed appearance of *exiguus*, but differed from *exiguus*, *subellipsis*, *rutilans*, &c., in the basal margin not being colored, that is, being all white and simple. The embryonic form is near to *rutilans*, the dorsal line being a little shorter, side margin to the middle gently sloping, and then nearly straight to the rounded basal margin—no hooks."

UNIO HALLENBECKII. Pl. 51, fig. 154.

Testâ lævi, suboblongâ, compressâ, ad latere planulatâ, valdè inæquilaterali, posticè subbiangulari, anticè obliquè rotundatâ; valvulis subcrassis; natibus prominulis, ad apices crebrè et concentricè undulatis; epidermide rufo-fuscâ, micante, obsoletè radiatâ; dentibus cardinalibus subgrandibus, compressis, erectis, crenulatis, in utroque valvulo duplicibus; lateralibus longis, crassis rectisque; margaritâ vel purpureâ vel salmonis colore tinctâ et valdè iridescente.

Shell smooth, somewhat oblong, compressed, flattened at the sides, very inequilateral, subbiangular behind, obliquely rounded before; valves rather thick; beaks slightly prominent, closely and concentrically undulate at the tips; epidermis reddish brown, shining and obscurely radiate; cardinal teeth rather large, compressed, erect, crenulate and double in both valves; lateral teeth long, thick and straight; nacre purple or salmon color and very iridescent.

Proc. Acad. Nat. Sci. 1859, p. 170.

Hab.—Flat Rock Creek and Four Mile Creek near Columbus, Georgia. G. Hallenbeck and Bishop Elliott.

My cabinet and cabinets of Mr. Hallenbeck and Bishop Elliott.

Diam. .9,

Length 1.7,

Breadth 3 inches.

Shell smooth, somewhat oblong, compressed, flattened at the sides, very inequilateral, somewhat biangular behind, obliquely rounded before; substance of the shell rather thick, very slightly thicker before; beaks slightly prominent, with numerous closely set, concentric undulations at the tips, the undulations being transverse and parallel on the sides; ligament rather long, somewhat thick and light brown; epidermis reddish brown, shining, usually with small green rays, and somewhat distant marks of growth; umbonial slope somewhat raised and obtusely angular; posterior slope rather long and narrow, with two impressed lines on each valve from the beaks to the posterior margin; cardinal teeth rather large, compressed, erect, crenulate and double in both valves; lateral teeth long, thick, straight and thickened towards the posterior end; anterior cicatrices distinct, rather large and well impressed; posterior cicatrices confluent, rather large and slightly impressed; dorsal cicatrices slightly above the centre of the cavity of the beaks; cavity of the shell very shallow and wide; cavity of the beaks very shallow and nearly round; nacre purple and very iridescent.

Soft Parts.—*Branchial uterus* occupies the whole leaf of the outer branchiæ. *Branchiæ* very wide, very short and nearly straight below, inner ones much the larger, free two-thirds the length of abdominal sack. *Palpi* small, ovate, transverse, united only at the upper portion of the posterior edges. *Mantle* thin, whitish, thickened at the border. *Branchial opening* large, with numerous small, brown papillæ. *Anal opening* rather large, with small brown papillæ on the inner edges. *Super-anal opening* very large and united below. Color of the mass whitish.

Embryonic shell short-pouch shape, clear white and very near to that of *phaseolus*, Hild.

Remarks.—This is a very variable species in outline, some being much more transverse than others. A very large number was sent to me by Mr. Hallenbeck. It is a member of the great *complanatus* group, but has a tendency to obliqueness, approaching *U. Tuomeyi* (nobis), that species however is more transversely ovate and smaller; some of the wider individuals remind one of the lighter colored specimens of *pullatus* (nobis), but that shell is wider and more inflated. The young *Hallenbeckii* are generally covered with green capillary rays, but some are entirely destitute of them, and are then brown. Some of the adults are greenish, owing to these rays, while others are entirely destitute of them. The undulations of the beaks are usually eight to twelve, and occupy the first growth of the shell, being parallel on the side and obtusely angular on the umbonial slope. I have great pleasure in dedicating this species to Garret Hallenbeck, Esq., to whom I owe its possession, and who has done so much to promote a knowledge of the mollusca of Georgia.

UNIO BALDWINENSIS. Pl. 51, fig. 155.

Testâ lævi, oblongâ, compressâ, ad latere planulatâ, inæquilaterali, posticè biangulatâ; valvulis subcrassis, anticè paulisper crassioribus; natibus prominulis; epidermide vel luteolâ vel fuscâ, eradiatâ; dentibus cardinalibus parviusculis, subcompressis, subelevatis, crenulatis, in utroque valvulo subduplicibus; lateralibus prælongis, lamellatis subrectisque; margaritâ vel albâ vel salmonis colore tinctâ et valdè iridescente.

Shell oblong, compressed, flattened at the sides, inequilateral, biangular behind; valves rather thick, a little thicker before; beaks a little prominent; epidermis yellowish or brown, without rays; cardinal teeth rather small, rather compressed, somewhat raised, crenulate, somewhat double in both valves; lateral teeth very long, lamellar and nearly straight; nacre white or salmon color and very iridescent.

Proc. Acad. Nat. Sci., 1859, p. 170.

Hab.—Carter's Creek, Baldwin County, Georgia. J. Postell.

My cabinet and cabinet of Mr. Postell.

Diam. .7,

Length 1.4,

Breadth 2.6 inches.

Shell oblong, compressed, flattened at the sides, inequilateral, biangular behind and round before; substance of the shell rather thick, slightly thicker before; beaks a little prominent; ligament rather long and thick; epidermis yellowish or brown, without rays, with distant lines of growth; umbonial slope slightly raised and obtusely angular; posterior slope raised into a carina, with two slightly raised lines passing, in each valve, from the beaks to the posterior margin; cardinal teeth rather small, rather compressed, somewhat raised, crenulate, double in the left and slightly double in the right valve; lateral teeth very long, lamellar, nearly straight and terminated at the posterior end by a slight enlargement; anterior cicatrices distinct, rather large and well impressed; posterior cicatrices confluent, rather large and slightly impressed; dorsal cicatrices placed above the centre of the cavity of the beaks; cavity of the shell shallow and wide; cavity of the beaks very shallow and rounded; nacre white or salmon color and very iridescent.

Remarks.—I have three specimens before me, neither of them very perfect. The one figured is moderately well preserved, but still the beaks are eroded so that the character of the undulations cannot be given. None were received in alcohol, thus the character of the soft parts are not known. This species belongs to the great *complanatus* group, and is nearly allied to the *Savannahensis* (nobis). It is more oblong, more compressed and not so high on the umbonial slope. It also reminds one of *spadiceus* (nobis). Two of the specimens have a fine salmon colored nacre, the other is white, with a slight tint of salmon. The largest specimen, three and a quarter inches wide, has a well defined ventral cicatrix in each valve.

UNIO RAEENSIS. Pl. 52, fig. 156.

Testâ lævi, oblongâ, subinflatâ, ad latere subimpressâ, posticè tumidâ et biangulatâ; valdè inæquilaterali, ad basim emarginatâ; valvulis subcrassis; natibus prominulis; epidermide rufo-fuscâ, substriaatâ, obsoletè radiatâ; dentibus cardinalibus parvis, valdè crenulatis; lateralibus prælongis curvisque; margaritâ purpureâ et iridescente.

Shell smooth, oblong, rather inflated, impressed on the sides, swollen and biangular behind, very inequilateral, emarginate at the base; valves somewhat thick; beaks slightly prominent; epidermis reddish brown, somewhat striate and obscurely rayed; cardinal teeth small, very crenulate; lateral teeth very long and curved; nacre purple and iridescent.

Proc. Acad. Nat. Sci., 1859, p. 171.

Hab.—Chattahoochee, near Columbus and Rae's Creek, Georgia. Bishop Elliott.

My cabinet and cabinet of Bishop Elliott.

Diam. .8,

Length 1.2,

Breadth 2.3 inches.

Shell smooth, oblong, rather inflated, impressed on the sides, swollen and biangular behind, rather obliquely rounded before, very inequilateral, emarginate at the base; substance of the shell somewhat thick, very slightly thickened before; beaks slightly prominent; ligament rather long, thin and light brown; epidermis reddish brown, somewhat striate, obscurely rayed, with well defined and rather close lines of growth; umbonial slope much raised, inflated and rounded; posterior slope slightly raised, with obscure small rays and with an obscure raised line from the beak on each valve to the posterior margin; cardinal teeth small, slightly raised and very crenulate; lateral teeth very long, lamellar and curved; anterior cicatrices distinct and well impressed; posterior cicatrices confluent and but slightly impressed; dorsal cicatrices small and placed under the plate, posterior to the cardinal teeth; cavity of the shell rather deep and wide; cavity of the beaks very shallow and rounded; nacre purple, slightly tinted with salmon and iridescent.

Soft Parts.—*Branchial uterus* not charged, but ova were found in the ovarium. *Branchiæ* rather small, oblique behind and rounded before, inner ones very much the larger, free nearly the whole length of abdominal sack. *Palpi* small, subtriangular, united one-fourth down the posterior edges. *Mantle* thin, thickened on the posterior edges. *Branchial opening* small, with a few, rather small, brownish papillæ. *Anal opening* large, with numerous, very small dark brown papillæ. *Super-anal opening* small, colored within and united below; color of the mass whitish.

Remarks.—Only two specimens were received from Bishop Elliott, the smaller one, apparently half grown, was in alcohol. The larger one seems to be entirely adult and is the one figured. In outline it is very near to *Neusensis* (nobis), but it is more inflated, has smaller teeth and a much lighter colored epidermis. In the enlarged umbonial slope and general form it is somewhat like *denigratus* (nobis), but differs in

being very much larger, more ponderous, and totally in the color of the epidermis, that species being almost jet black. It is also allied to *sordidus* (nobis), having nearly the same colored epidermis, but that species is elliptical, is not enlarged over the umbonial slope, nor is it emarginate.

UNIO SALEBROSUS. Pl. 52, fig. 157.

Testâ lævi, oblongâ, subcompressâ, ad latere planulatâ, posticè biangulatâ, anticè subtruncatâ, valdè inæquilaterali; valvulis subcrassis, anticè paulisper crassioribus; natibus subprominentibus, ad apices crebrè et concentricè undulatis; epidermide vel rufo-fuscâ vel luteo-fuscâ et valdè striatâ; dentibus cardinalibus subgrandibus, striatis, subelevatis crenulatisque; lateralibus prælongis subcurvisque; margaritâ vel albâ vel salmoniâ, rarè purpureâ et iridescente.

Shell smooth, oblong, rather compressed, flattened at the sides, biangular behind, subtruncate before, very inequilateral; valves rather thick, slightly thicker before; beaks slightly prominent, closely and concentrically undulate at the tips; epidermis reddish brown or yellowish brown and very much striate; cardinal teeth rather large, striate, somewhat raised and crenulate; lateral teeth very long and somewhat curved; nacre white or salmon color, rarely purple, iridescent.

Proc. Acad. Nat. Sci. 1859, p. 170.

Hab.—Flat Rock Creek, Bull Creek, G. Hallenbeck and Chattahoochee River near Columbus, Georgia. Bishop Elliott.

My cabinet and cabinets of Bishop Elliott and Mr. Hallenbeck.

Diam. .9, Length 1.6, Breadth 3.1 inches.

Shell smooth, oblong, rather compressed, flattened on the sides, biangular behind, somewhat truncate before, very inequilateral, nearly straight on the basal margin; substance of the shell rather thick, slightly thicker before; beaks slightly prominent, with close and concentric undulations at the tips, the undulations being transverse and parallel on the sides; ligament long, somewhat thick and light brown; epidermis reddish brown or yellowish brown, sometimes with greenish rays, usually without rays, with rather distant marks of growth; umbonial slope somewhat raised and obtusely angular; posterior slope narrow, raised into a carina, with an obscure groove from the beaks to posterior margin on each valve; cardinal teeth rather large, striate, somewhat raised, crenulate, single in the right and double in the left valve; lateral teeth very long, somewhat curved, thickened towards the posterior end, anterior cicatrices distinct, large and well impressed; posterior cicatrices confluent, large and slightly impressed; dorsal cicatrices placed over the centre of the cavity of the beaks; cavity of the shell rather shallow and wide; cavity of the beaks very shallow and rounded; nacre usually white, sometimes salmon color, rarely purple, iridescent.

Soft Parts.—*Branchial uterus* occupies the whole leaf of the outer branchiæ. *Branchiæ* very wide, very short, slightly curved below, inner ones being very much the larger, free two-thirds the length of the abdominal sack. *Palpi* small, ovate,

transverse, united only at the upper portion of the posterior edges. *Mantle* thin, whitish, thickened at the border. *Branchial opening* large, with numerous very dark brown papillæ on the inner edges. *Super-anal opening* very large, colored on the inner edges and united below. Color of the mass whitish.

Remarks.—I have quite a number of this species from Bishop Elliott and Mr. Hallenbeck, but none with the soft parts. In outline it is very near to *Roswellensis* (nobis), but it is rather more transverse and less compressed. In the color of the epidermis it is very different, that species being dark brown or nearly black, while this is usually light or reddish brown. In the cardinal teeth they also differ, the *salebrosus* being single in the right valve, while in the other it is double. It is allied on the other side to *Hallenbeckii* (nobis), but is a much wider shell and is more biangular at the posterior margin. Several of the specimens have well defined ventral cicatrices.

UNIO INUSITATIS. Pl. 52, fig. 158.

Testâ lævi, oblongâ, subcompressâ, ad latere planulatâ et contractâ, posticè obtusè biangulatâ, valdè inæquilaterali; valvulis crassiusculis; natibus prominulis, ad apices minutè undulatâ; epidermide luteâ et fuscâ, supernè glabrâ, infernè tenebroso-striatâ, obsoletè radiatâ; dentibus cardinalibus parvis, acuminatis, crenulatis, in utroque valvulo duplicibus; lateralibus longis, lamellatis subrectisque; margaritâ vel albâ vel purpureâ vel salmonis colore tinctâ et valdè iridescente.

Shell smooth, oblong, rather compressed, flattened at the sides and contracted, obtusely angular behind, very inequilateral; valves somewhat thick; beaks slightly prominent and minutely undulate at the tip, epidermis yellowish and brown, smooth above and dark and striate below; cardinal teeth small, pointed, crenulate, double in both valves; lateral teeth long, lamellar, and nearly straight; nacre white, purple or salmon color, and very iridescent.

Proc. Acad. Nat. Sci. 1859, p. 171.

Hab.—Swift Creek, below Macon, Georgia. Bishop Elliott.

My cabinet and cabinet of Bishop Elliott.

Diam. .8, Length 1.2, Breadth 2.3 inches.

Shell smooth, oblong, rather compressed, flattened at the sides and contracted at the second growth, obtusely angular behind and regularly rounded before, very inequilateral; substance of the shell somewhat thick; beaks slightly prominent, with numerous small, closely set undulations, which are angular on the umbonial slope; ligament rather long and somewhat thick; epidermis obscurely radiate and smooth above, striate and usually banded with yellow below; umbonial slope slightly raised and obtusely angular; posterior slope raised into a rather sharp carina and usually with two obscure impressed lines in each valve; cardinal teeth small, pointed, crenulate, double in both valves, but only slightly so in the left one; lateral teeth long,

lamellar and nearly straight; anterior cicatrices distinct and well impressed; posterior cicatrices confluent and slightly impressed; dorsal cicatrices placed under the plate above the centre of the cavity of the beaks; cavity of the shell shallow and wide; cavity of the beaks shallow and rounded; nacre white, purple or salmon and very iridescent.

Soft Parts.—*Branchial uterus* occupying, like *complanatus*, the whole width of the outer branchiæ, which were filled with ova, but none were matured; ova were found also in the ovarium. *Branchiæ* wide, oblique behind and rounded before, inner ones much the larger. *Palpi* thin, subtriangular, united one-fourth down the posterior edges. *Mantle* thin, thickened at the margin, obtusely angular behind. *Branchial opening* rather large, with small brown papillæ. *Anal opening* rather large, with numerous small brown papillæ. *Super-anal opening* very long and united below. Color of the mass light salmon.

Remarks.—I have about a dozen of this species before me, three of which are females in alcohol. It is of the *complanatus* group, but is more quadrate, thinner and smaller than that species. There is one very unusual character about these specimens, but it may not be permanently characteristic, as I have seen it occasionally in other species, though rarely. I mean the sudden constriction at the second line of growth about the middle of the disk, which forms a kind of hip there and gives the upper portion an inflated form. Above this line the disk is smooth, usually brown, sometimes yellowish, and obscurely rayed, while below it is without rays and usually transversely banded with yellow and brown. The stricture about the middle of the disk is always apparent inside, as the plane of the nacre is interrupted by it. In two of the specimens there is a well impressed ventral cicatrix in each valve. In a single specimen the beaks are nearly perfect, and the fine undulations are sufficiently so to be characterized. They are much like those of *complanatus*, being transverse on the side and angular on the umbonial slope. From the appearance of all the specimens I suspect that, when young, that is before they have arrived at the age of constriction, the disks are all yellow and nearly covered with fine green rays. On all the specimens received there was more or less red oxide of iron, which obscured the epidermis and was difficult to remove.

UNIO LATUS. Pl. 53, fig. 159.

Testâ lævi, transversâ, compressâ, posticè obtusè angulatâ, valdè inæquilaterali; valvulis subtenuibus; natibus prominulis; epidermide luteolâ vel luteo-fuscâ, micante et perradiatâ; dentibus cardinalibus parvis, subcompressis, striatis; lateralibus prælongis, lamellatis subrectisque; margaritâ vel albâ vel purpurascente vel salmonis colore tinctâ et valdè iridescente.

Shell smooth, transverse, compressed, obtusely angular behind, very inequilateral; valves rather thin; beaks slightly prominent; epidermis yellowish or yellowish brown, shining and rayed all over; cardinal teeth small, rather compressed and

striate; lateral teeth very long, lamellar and nearly straight; nacre white, purplish or salmon color and very iridescent.

Proc. Acad. Nat. Sci. 1859, p. 171.

Hab.—Savannah River, near Savannah, Georgia. Rev. G. White and Major Le Conte.

My cabinet and cabinets of Mr. White and Major Le Conte.

Diam. .5, Length 1.1, Breadth 2.3 inches.

Shell smooth, transverse, compressed, obtusely angular behind, rounded before and very inequilateral; substance of the shell rather thin, beaks slightly prominent; ligament rather thin and light brown; epidermis yellowish or yellowish brown, shining, with very distant marks of growth, and rayed over the whole disk; umbonial slope slightly raised and obtusely angular; posterior slope very long, narrow, subcarinate, striate, with two indistinct impressed lines on each valve from the beaks to the posterior margin; cardinal teeth small, rather compressed slightly raised, striate; lateral teeth very long, lamellar and nearly straight; anterior cicatrices distinct and moderately well impressed; posterior cicatrices confluent and slightly impressed; dorsal cicatrices in a row situated across the centre of the cavity of the beaks; cavity of the shell shallow and wide; cavity of the beaks very shallow and obtusely angular; nacre white, purplish, salmon color and very iridescent.

Remarks.—I have four specimens of this species before me. None were received with the soft parts. It belongs to the *complanatus* group, but is wider than that species. It is not so wide as *angustatus* (nobis), and is more yellow and rayed. It is also near to *Duttonianus* (nobis), but not nearly so wide. It is more carinate on the posterior slope than either of the above named species. Like *complanatus* it varies in the nacre. Of the four specimens before me, one is white, two are purplish and one is salmon color. The marks of growth are very distinct, and the fine green rays cover the whole disk. In the older ones the posterior slope becomes rugose with striæ and is dark brown.

UNIO VERUTUS. Pl. 53, fig. 160.

Testâ lævi, transversâ, subinflatâ, ad latere planulatâ, posticè obtusè angulatâ, anticè rotundatâ et valdè inæquilaterali; valvulis crassiusculis, anticè paulisper crassioribus; natibus prominulis, ad apices crebrè undulatis; epidermide rufo-fuscâ, radiatâ vel eradiatâ; dentibus cardinalibus subgrandibus, compressis, subelevatis, striatis, in utroque valvulo duplicibus; lateralibus prælongis, lamellatis, subcrassis subcurvisque; margaritâ vel albâ vel salmoniâ vel purpurascente et valdè iridescente.

Shell smooth, transverse, rather inflated, flattened at the side, obtusely angular behind, rounded before and very inequilateral; valves somewhat thick, slightly thicker before; beaks a little prominent, at the tips closely undulate; epidermis reddish brown, sometimes radiate and sometimes without rays; cardinal teeth rather large, compressed, rather raised, striate and double in both valves; lateral teeth very

long, lamellar, rather thick and slightly curved; nacre either white, salmon or purplish and very iridescent.

Proc. Acad. Nat. Sci. 1859, p. 171.

Hab.—Flat Rock Creek near Columbus, Georgia. G. Hallenbeck.

My cabinet and cabinet of Mr. Hallenbeck.

Diam. 1, Length 1.7, Breadth 3.6 inches.

Shell smooth, transverse, rather inflated, flattened at the side, obtusely angular behind, rounded before and very inequilateral; substance of the shell somewhat thick, slightly thicker before; beaks a little prominent, at the tips furnished with close, parallel undulations which are angular on the umbonial slope; ligament rather long, thick and light brown; epidermis reddish brown, sometimes with numerous fine green rays, sometimes without any; umbonial slope somewhat raised and obtusely angular; posterior slope somewhat broad, with two obscure grooves from the beaks to the posterior margin on each valve; cardinal teeth rather large, compressed somewhat raised, striate, crenulate and double in both valves; lateral teeth very long, lamellar, rather thick and slightly curved; anterior cicatrices large, distinct and deeply impressed; posterior cicatrices large, confluent and slightly impressed; dorsal cicatrices placed immediately over the cavity of the beaks; cavity of the shell rather shallow and wide; cavity of the beaks very shallow and rounded; nacre either white, salmon or purplish, sometimes consisting of either two of these colors; nacre very iridescent.

Remarks.—I have about a dozen of this species of various ages from Mr. Hallenbeck. It is nearly allied to *Hallenbeckii* on one side and *salebrosus* on the other. It is transverse like the latter, but is not biangular behind as that species is. It is somewhat oblique and angular on the umbonial slope like the former, but it is much more transverse. Some of the specimens, particularly the middle aged and young, have numerous green rays, while the older ones with decorticated beaks and worn umbones are quite destitute of them. The nacre is generally very beautiful. Each specimen usually has two colors. The most common is light purple on the margin, and salmon in the centre of the cavity, and in the beaks; sometimes white takes the place of the salmon color. One of the specimens is all white and another is all purple. Two of the younger specimens have the green rays so close that the disk presents a quite green surface.

UNIO VIRIDIRADIATUS. Pl. 53, fig. 161.

Testâ lævi, latè ellipticâ, compressâ, posticè dilatâtâ et obtusè angulatâ, anticè regulariter rotundâ, valdè inæquilateralî; valvulis subtenuibus; natibus prominulis, ad apices minutè et irregulariter undulatis; epidermide subnitidâ, radiis crebris capillaris; dentibus cardinalibus parvis, crenulatis, in utroque valvulo duplicibus; lateralibus longis, lamellatis subrectisque; margaritâ purpureâ et valdè iridescente.

Shell smooth, broadly elliptical, compressed, flattened behind and obtusely angular,

regularly rounded before and very inequilateral; valves rather thin; beaks slightly prominent, minutely and regularly undulate at the tips; epidermis somewhat shining and covered with small rays; cardinal teeth small, crenulate and double in both valves; lateral teeth long, lamellar and nearly straight; nacre purple and very iridescent.

Proc. Acad. Nat. Sci. 1859, p. 154.

Hab.—Big Uchee River, Alabama, near Columbus, Georgia. G. Hallenbeck.

My cabinet and cabinet of Mr. Hallenbeck.

Diam. .7, Length 1.2, Breadth 2.6 inches.

Shell smooth, broadly elliptical, compressed, flattened behind and obtusely angular, regularly rounded before and very inequilateral; substance of the shell rather thin, very slightly thicker before; beaks slightly prominent, minutely and irregularly undulate at the tips; ligament rather long, somewhat thick and light brown; epidermis somewhat shining, thickly covered with small green rays over the whole disk, with rather distant marks of growth; umbonial slope very slightly raised and very obtusely angular; posterior slope very narrow, carinate, with two slightly impressed lines and usually with well marked yellow and green rays from the beaks to the posterior margin; cardinal teeth small, crenulate, striate, and double in both valves; lateral teeth long, lamellar, enlarged towards the posterior end and nearly straight; anterior cicatrices distinct and well impressed; posterior cicatrices confluent and slightly impressed; dorsal cicatrices placed immediately over the centre of the cavity of the beaks; cavity of the shell very shallow and broad: cavity of the beaks very shallow and rounded; nacre purple and very iridescent.

Remarks.—Nearly a dozen specimens are before me of different ages, but none were received with the soft parts. This species belongs to the *complanatus* group, but it is more transverse than that shell usually is. It also has a more lenticular aspect, the greatest cross diameter being nearly in the centre of the disks. All the specimens received have a purple nacre and this no doubt is the prevalent color, but still it may, like *complanatus*, sometimes be found salmon color or white. It is somewhat allied to *salebrosus* (nobis), but may easily be distinguished by its being of a more elliptical outline, and in being usually darker in the epidermis and covered with capillary green rays which cover the whole disk. The undulations of the beaks also differ. In the *viridiradiatus* the anterior superior tractor muscle makes a cicatrix on the posterior side of the great adductor, and in some specimens this cicatrix is quite separate, leaving a small ridge between the two.

UNIO VIRIDANS. Pl. 54, fig. 162.

Testâ lævi, oblongâ, compressâ, ad latere planulatâ, posticè biangulatâ, anticè rotundatâ, valdè inæquilaterali; valvulis subtenuibus; natibus prominulis, ad apices undulatis; epidermide fusco-viridi, striatâ, obsoletè radiatâ; dentibus cardinalibus parvis, striatis, crenulatis; lateralibus prælongis, lamellatis, subrectisque; margaritâ vel albâ vel salmoniâ, sæpè purpureâ et valdè iridescente.

Shell smooth, oblong, compressed, flat at the sides, biangular behind, rounded before, very inequilateral; valves rather thin; beaks a little prominent and undulate at the tips; epidermis brownish green, striate, obsoletely radiate; cardinal teeth small, striate, crenulate; lateral teeth very long, lamellar and nearly straight; nacre white, salmon, often purple and very iridescent.

Proc. Acad. Nat. Sci. 1859, p. 170.

Hab.—Near Columbus, Georgia. G. Hallenbeck.

My cabinet and cabinet of Mr. Hallenbeck.

Diam. .5,

Length .9,

Breadth 2 inches.

Shell smooth, oblong, compressed, flattened at the sides, biangular behind, rounded before, very inequilateral; substance of the shell thin; beaks a little prominent, with small transverse undulations at the tips; ligament long, thin and light brown; epidermis brownish green, striate, obscurely radiate, with distant obscure lines of growth; umbonial slope slightly raised and rounded; posterior slope carinate, with two indistinct lines in each valve from the beaks to the margin; cardinal teeth small striate, crenulate, slightly raised; lateral teeth very long, lamellar and nearly straight; anterior cicatrices distinct and moderately well impressed; posterior cicatrices confluent and slightly impressed; dorsal cicatrices situated under the plate posterior to the cardinal teeth; cavity of the shell very shallow and wide; cavity of the beaks very shallow and rounded; nacre usually purplish, sometimes white or salmon and very iridescent.

Remarks.—Mr. Hallenbeck sent me a number of specimens of this species, but no soft parts were received. In outline it is very near to *salebrosus* (nobis), but is a much smaller and thinner shell, and it differs in the color of the epidermis, which is greenish and not yellowish or reddish brown, and it is more oblique. It is also near to *viridiradiatus* (nobis), being greenish and about the same size and thickness, but it is more oblong, that species being more elliptical and more radiate.

UNIO QUADRATUS. Pl. 54, fig. 163.

Testâ lævi, quadratâ, compressâ, ad latere planulatâ, inæquilaterali, posticè obtusè biangulatâ; valvulis subcrassis; natibus prominulis; epidermide vel rufo-fuscâ vel tenebroso-fuscâ et obsoletè radiatâ; dentibus cardinalibus subcrassis, compresso-conicis, crenulatis, in utroque valvulo duplicibus; lateralibus longis, lamellatis, crassis curvisque; margaritâ vel albâ vel purpurescente et iridescente.

Shell smooth, quadrate, compressed, flattened at the sides, inequilateral, obtusely biangular behind; valves rather thick; beaks a little prominent; epidermis reddish brown or dark brown and obsoletely rayed; cardinal teeth rather thick, compressed conical, crenulate, double in both valves; lateral teeth long, lamellar, thick and curved; nacre white or purplish and iridescent.

Proc. Acad. Nat. Sci. 1859, p. 172.

Hab.—Carter's Creek, J. Postell, and Factory Creek, Georgia. G. Hallenbeck.

My cabinet and cabinets of Mr. Postell and Mr. Hallenbeck.

Diam. .9,

Length 1.8,

Breadth 2.9 inches.

Shell smooth, quadrate, compressed, flattened at the sides, inequilateral, obtusely biangular behind; substance of the shell rather thick, beaks a little prominent; ligament rather long, thick and brown; epidermis striate, shining towards the beaks, reddish brown or dark brown, obsoletely rayed and with rather distant marks of growth; umbonial slope slightly raised and rounded; posterior slope slightly raised, with an obscure furrow from the beaks to the posterior margin; cardinal teeth rather thick, compressed, conical, crenulate and double in both valves; lateral teeth long, lamellar, thick and curved; anterior cicatrices distinct and deeply impressed; posterior cicatrices confluent and well impressed; dorsal cicatrices usually a single well impressed one in nearly the centre of the cavity of the beaks of each valve; cavity of the shell shallow and wide; cavity of the beaks very shallow and obtusely angular; nacre white or purplish and iridescent.

Soft parts.—*Branchial uterus* ——. *Branchiæ* large, very thin, rounded below, inner ones rather the larger, free nearly the whole length of the abdominal sack. *Pulpi* large, transverse, suboval, united half way down the posterior edges. *Mantle* thin, whitish. *Branchial opening* rather large, with rather large dark papillæ. *Anal opening* rather large, with numerous very small brown papillæ on the inner edges. *Super-anal opening* very large, not united below, slightly colored on the inner edges. Color of the mass whitish.

Remarks.—This belongs to the great *complanatus* group, and certainly approaches to the type, but it is more square in its outline, reminding one of *hebes* (nobis). It is larger than the latter species and not so high in the posterior slope. The specimen figured is from Factory Creek, near Columbus, Georgia. From this stream they are lighter in the color of the epidermis than those from Carter's Creek, and they are usually of a light purple in the nacre, while those from Carter's Creek have a dark brown epidermis and have a white nacre. A single one from Factory Creek out of fifteen was inclined to salmon color. The lateral teeth are usually very stout and the inferior duplicature is much thicker than the superior one, and is enlarged and suddenly terminated at the posterior end.

UNIO JONESII. Pl. 54, fig. 164.

Testâ lævi, ellipticâ, subinflâtâ, valdè inæquilaterali, posticè obtusè angulatâ; valvulis subtenuibus, anticè crassioribus; natibus prominulis, ad apices undulatis; epidermide luteâ, radiis interruptis; dentibus cardinalibus parviusculis, erectis, conicis; lateralibus sublongis, lamellatis rectisque; margaritâ vel albâ vel salmonis colore tinctâ et valdè iridescente.

Shell smooth, elliptical, slightly inflated, very inequilateral, obtusely angular

Shell smooth, elliptical, somewhat inflated, slightly flattened at the sides, very inequilateral, obtusely angular behind, rounded before; substance of the shell rather thin, thicker before; beaks slightly prominent; ligament short, thin and brown; epidermis yellowish olive, shining, with rather indistinct rays disposed to be spotted and somewhat distant lines of growth; umbonial slope slightly raised and obtusely angular; posterior slope rather low, slightly grooved and slightly emarginate at posterior margin; cardinal teeth small, compressed-conical, crenulate, single in the right and double in the left valve; lateral teeth long, lamellar and slightly curved; anterior cicatrices distinct and well impressed; posterior cicatrices confluent and slightly impressed; dorsal cicatrices placed under the plate behind the cardinal tooth; cavity of the shell rather deep and wide; cavity of the beaks shallow and subangular; nacre white or purplish and very iridescent.

Remarks.—Two specimens only were received from Prof. Tuomey. The smaller one imperfect and more yellow in the epidermis. The larger one, figured, is purple tinted in the cavity and in the teeth, the other is white with yellow spots made by deposit of epidermal matter in the layers of the nacre. It is near to *glaber* (nobis), inclining towards *pusillus* (nobis). It is easily distinguished from the former by being thicker, more oblique, less rayed, being more inflated and of a darker color in the epidermis. It is not so dark, so oblique nor so transverse as *pusillus*. Near the anterior margin both specimens are slightly sulcate. The beaks were not sufficiently perfect to shew any undulations.

UNIO VIRESCENS. Pl. 55, fig. 166.

Testâ lævi, ellipticâ, subinflatâ, posticè angulatâ, valdè inæquilaterali; valvulis subtenuibus, anticè crassioribus; natibus prominulis; epidermide nitidâ, luteo-viridi, obsoletè radiatâ, posticè tenebrosâ; dentibus cardinalibus parvis, acuminatis, crenulatis, in utroque valvulo duplicibus; lateralibus longis, lamellatis rectisque; margaritâ albâ et valdè iridescente.

Shell smooth, elliptical, subinflated, angular behind, very inequilateral; valves rather thin, thicker before; beaks a little prominent; epidermis shining, yellowish green, obsoletely radiate, dark behind; cardinal teeth small, acuminate, crenulate and double in both valves; lateral teeth long, lamellar and straight; nacre white and very iridescent.

Proc. Acad. Nat. Sci. 1858, p. 40.

Hab.—Tennessee River at Tuscumbia, Alabama. B. Pybas.

My cabinet and cabinets of Mr. Pybas and Mr. Thornton.

Diam. .9,

Length 1.3,

Breadth 2.2 inches.

Shell smooth, elliptical, somewhat inflated, very inequilateral, angular behind and rounded before; substance of the shell rather thin, thicker before; beaks a little prominent; ligament short, rather thick and dark brown; epidermis shining, yellowish

green, obsoletely radiate, dark behind, with distant marks of growth; umbonial slope raised and obtusely angular; posterior slope rather wide, somewhat flat and furnished with small rays from the beaks to the margin; cardinal teeth small, acuminate, crenulate and double in both valves: lateral teeth long, lamellar and straight; anterior cicatrices distinct, rather large and well impressed; posterior cicatrices confluent and very slightly impressed; dorsal cicatrices placed on the plate in the cavity of the beaks; cavity of the shell rather deep and wide; cavity of the beak deep and angular, nacre white and very iridescent.

Remarks.—This belongs to the group of which *cariosus*, Say, may be considered the type. It is, however, a smaller species and rather more transverse, and the undulations of the beaks are much smaller. The posterior slope is quite dark while the remaining portion of the epidermis is smooth, polished and olive yellow.

UNIO SCITULUS. Pl. 55, fig. 167.

Testâ lævi, ellipticâ, inflatâ, valdè inæquilateralî, posticè obtusè biangulatâ, anticè rotundatâ; valvulis subtenuibus, anticè crassioribus; natibus prominentibus, ad apices undulatis; epidermide luteâ, undique virido-radiatâ; dentibus cardinalibus parviusculis, erectis, acuminatis, crenulatis, in utroque valvulo duplicibus; lateralibus longis, lamellatis subrectisque; margaritâ albâ et valdè iridescente.

Shell smooth, elliptical, inflated, very inequilateral, obtusely angular behind and rounded before; valves rather thin, thicker before; beaks somewhat prominent, undulate at the tips; epidermis yellow, with green rays all over; cardinal teeth rather small, erect, pointed, crenulate and double in both valves; lateral teeth long, lamellar and nearly straight; nacre white and very iridescent.

Proc. Acad. Nat. Sci. 1860, p. 93.

Hab.—Tuscumbia, Alabama. L. B. Thornton, Esq.

My cabinet and cabinet of Mr. Thornton.

Diam. .7,

Length 1.1,

Breadth 2.1 inches.

Shell smooth, elliptical, inflated, very inequilateral, obtusely angular behind and rounded before; substance of the shell rather thin, thicker before; beaks somewhat prominent, with small undulations at the tips; ligament rather large and dark brown; epidermis yellow, with numerous green rays over the whole disk and with rather distant marks of growth; umbonial slope raised and rounded; posterior slope slightly raised, with numerous small rays; cardinal teeth rather small, erect, pointed, crenulate and double in both valves; lateral teeth long, lamellar and nearly straight; anterior cicatrices distinct and well impressed; posterior cicatrices confluent and slightly impressed; dorsal cicatrices placed in the centre of the cavity of the beaks and on the under side of the plate; cavity of the shell rather deep and wide; cavity of the beaks rather shallow and subangular; nacre white and very iridescent.

Remarks.—This is a pretty little species nearly allied to *radians* (nobis), but it is more oblique, more angular posteriorly and not so much inflated, nor are the rays so

large or distinct. The cardinal teeth are very much alike, but the lateral teeth of *scitulus* are longer. It has also a close resemblance on the other side to *concarvus* (nobis), but it is smaller, has the beaks less medial, has larger rays and a less number, the epidermis is more yellow and the cardinal teeth are less compressed. It also approaches in outline and the rays to *Novi-Eboraci* (nobis), but is not so oblique. The females seem to be much smaller than the males, and have three or four large green rays over the enlarged umbonial slope. I have not seen the soft parts of this species. Three of the specimens bear the enlarged female character in the shell, six that of the form of males. Some of the specimens have more numerous and rather smaller rays, and some of the broad rays are disposed to divide into capillary forms. One of the specimens has the double lateral tooth on the right or reversed side, which is a very rare occurrence, but which I have seen in several other species and have mentioned elsewhere.

UNIO JOHANNIS. Pl. 55, fig. 168.

Testâ obliquo-ellipticâ, subinflatâ, posticè obtusè angulatâ, valdè inæquilaterali; valvulis subcrassis, anticè crassioribus; natibus subelevatis; epidermide tenebroso-viridi, ad umbones micante, posticè luteâ; dentibus cardinalibus subcrassis, compressis, suberectis; lateralibus curtis, rectis, subcrassis corrugatisque; margaritâ albâ et valdè iridescente.

Shell obliquely elliptical, somewhat inflated, obtusely angular behind and very inequilateral; valves rather thick, thicker before; beaks rather elevated; epidermis dark green, yellow behind, shining on the umbones; cardinal teeth rather thick, compressed and somewhat erect; lateral teeth short, straight, rather thick and rough; nacre white and very iridescent.

Proc. Acad. Nat. Sci. 1859, p. 171.

Hab.—Connasauga River, Bishop Elliott, and Etowah River, Georgia, Rev. G. White; Alabama River, Dr. Budd.

My cabinet and cabinets of Bishop Elliott, Rev. Mr. White and Dr. Budd.

Diam. .5, Length .7, Breadth 1 inch.

Shell obliquely elliptical, somewhat inflated, obtusely angular behind, rounded before and very inequilateral; substance of the shell rather thick, much thicker before; beaks rather elevated; ligament very short, rather thin, light brown; epidermis dark green, yellow behind, shining on the umbones and striate below, with two or three distant marks of growth; umbonial slope slightly raised and rounded; posterior slope moderately wide, usually bright yellow with two well marked green rays on each valve passing from the beaks to the posterior margin; cardinal teeth rather thick, compressed, somewhat erect, single in the right and double in the left valve; lateral teeth short, straight, rather thick and rough; anterior cicatrices distinct, small and well impressed; posterior cicatrices distinct, small and moderately impressed; dorsal cicatrices placed under the plate and behind the cardinal teeth; cavity

of the shell somewhat deep and rounded; cavity of the beaks rather shallow and sub-angular; nacre pure white and very iridescent behind.

Remarks.—I have eight specimens of this small species before me. There were no soft parts received. One of the specimens was quite young, but the beaks were too much eroded to describe the undulations, which seem to be small and few. In outline it is near to *paulus*, *nux* and *Brumbyanus* (nobis). It also reminds one of *castaneus* and *Henleyanus* (nobis), but it need not be confounded with either of the above. Usually the whole disk is of a fine deep green, except the posterior slope, which is yellow with two well marked rays on each valve. I know of no other species which has these colors so well defined in this manner. *Paulus* has obscure rays on the posterior slope somewhat like this. Some of the specimens have a little yellowness on the anterior margin. One of them is so dark a green as to appear almost blackish brown. A specimen in Mr. Mactier's cabinet is yellow over the disks except at two lines of growth and on the posterior part, where there are three well defined dark green rays on each valve. The two largest specimens are one inch and three-tenths wide. I have great pleasure in naming this after my young friend John Elliott, who has already done much in making known the *mollusca* of his native state of Georgia.

UNIO CACAO. Pl. 56, fig. 169.

Testâ lævi, oblongâ, subquadratâ, compressâ, ad latere planulatâ, posticè obtusè angulatâ, inæquilaterali; valvulis subcrassis, anticè crassioribus; natibus prominulis; epidermide castaneâ, supernè micante, infernè striatâ; dentibus cardinalibus crassiusculis, striatis, suberectis, in utroque valvulo duplicibus; lateralibus curtis, lamellatis rectisque; margaritâ purpurascente et valdè iridescente.

Shell smooth, oblong, nearly square, compressed, flattened at the sides, obtusely angular behind and inequilateral; valves somewhat thick, thicker before; beaks a little prominent; epidermis chestnut brown, shining above and striate below; cardinal teeth somewhat thick, striate, somewhat erect and double in both valves; lateral teeth short, lamellar and straight; nacre purplish and very iridescent.

Proc. Acad. Nat. Sci. 1859, p. 154.

Hab.—Chacktahachie River, West Florida. Major Le Conte.

Cabinet of Major Le Conte.

Diam. .5,

Length .9,

Breadth 1.3 inches.

Shell smooth, oblong, nearly square, compressed, flattened at the sides, obtusely angular behind, broadly rounded before, inequilateral; substance of the shell somewhat thick, thicker before; beaks a little prominent; ligament very short, small and light brown; epidermis dark chestnut brown, shining above and transversely striate below; umbonial slope somewhat raised and rounded; posterior slope narrow, raised into a small carina, with two irregular, indistinct, impressed lines from the beaks to the posterior margin on each valve; cardinal teeth somewhat thick, striate, somewhat erect, crenulate and double in both valves; lateral teeth short, lamellar and

straight; anterior cicatrices small, distinct and well impressed; posterior cicatrices nearly distinct and very slightly impressed; dorsal cicatrices situated under the plate immediately above the centre of the cavity of the beaks; cavity of the shell moderately deep and wide; cavity of the beaks deep and angular; nacre purplish and very iridescent.

Remarks.—A single specimen only of this interesting little species without the soft parts, was obtained by Major LeConte. It is remarkable for its quadrate outline and flattened side, reminding one of a large bean of the *Theobroma cacao* or common coco. It inclines also to that shade of brown in the epidermis, but is rather more chestnut brown. In outline it very closely approaches *U. modestus*, Fer.; but that species which comes from Brazil has a blackish epidermis and a white nacre, and it is rather smaller, thinner and higher on the posterior slope. The *cacao* has some resemblance to *succissus* (nobis), but that species is rotundo-triangular, and rather larger in the elevation of the posterior slope.

UNIO LINGUÆFORMIS. Pl. 56, fig. 170.

Testâ lævi, ellipticâ, compressâ, ad latere planulatâ, inæquilaterali, posticè obtusè biangulatâ, anticè rotundatâ; valvulis subtenuibus, anticè crassioribus; natibus prominulis; epidermide pallido-luteâ, subnitidâ, virido-radiatâ; dentibus cardinalibus parviusculis, obtuso-conicis, crenulatis, in utroque valvulo duplicibus; lateralibus sublongis, lamellatis subcurvisque; margaritâ albâ et valdè iridescente.

Shell smooth, elliptical, compressed, flattened at the sides; inequilateral, obtusely biangular behind, rounded before; valves rather thin, thicker before; beaks slightly prominent; epidermis pale yellow, somewhat shining, with greenish rays; cardinal teeth rather small, obtusely conical, crenulate and double in both valves; lateral teeth rather long, lamellar and slightly curved; nacre white and very iridescent.

Proc. Acad. Nat. Sci. 1860, p. 305.

Hab.—Columbus, Georgia, Dr. Boykin; and French Broad River, Tennessee, Dr. Edgar.

My cabinet.

Diam. .6, Length 1.1, Breadth 2 inches.

Shell smooth, elliptical, compressed, flattened at the sides, inequilateral, obtusely biangular behind and rounded before; substance of the shell rather thin, thicker before; beaks slightly prominent; ligament rather short, somewhat thick and dark brown; epidermis pale yellow, somewhat shining, with greenish interrupted rays over the posterior and middle portions of the disk, and with rather distant marks of growth; umbonial slope slightly raised and somewhat flattened; posterior slope somewhat carinate and with a slightly impressed rather broad groove which causes an emargination on the posterior superior margin; cardinal teeth rather small, obtusely conical, crenulate and double in both valves, but slightly so in the left; lateral teeth

Remarks.—A single specimen of this species was sent to me many years since by Dr. Boykin, and subsequently Dr. Edgar sent me a smaller one from Tennessee. I have always found it difficult, on examining them, where to place them. They differed in some characters from all the members of this group. I therefore determined, on a thorough examination of the group, to give it a distinct place. It has some resemblance to *Cumberlandianus* (nobis), but more closely resembles *fucatus*, herein described. It differs, however, from the latter in being smaller, more compressed, less transverse, and in having fewer and less distinct rays; also in being flatter at the sides, which makes the basal margin almost straight. It is very near to *tener* (nobis) in outline, but is a thinner shell, and not quite so flat on the sides.

Testâ lævi, subtrigonâ, compressâ, inæquilaterali, posticè obtusè angulatâ, anticè rotundâ; valvulis subcrassis, anticè crassioribus; natibus prominulis, ad apices rugoso-undulatis; epidermide luteo-fuscâ, micante, virido-radiatâ; dentibus cardinalibus crassiusculis, erectis, compressis crenulatisque; lateralibus subcurtis, crassis subcurvisque; margaritâ albâ et iridescente.

Proc. Acad. Nat. Sci., 1860, p. 92.

My cabinet and cabinet of Mr. Thornton.

Shell smooth, subtriangular, disposed to be subcircular, compressed, inequilateral, obtusely angular behind and rounded before; substance of the shell rather thick, thicker before; beaks rather prominent and rugosely undulate at the tips; ligament very short and rather thin; epidermis yellowish brown, shining, with small green rays more fasciculate over the middle of the disk, with distant lines of growth; umbonial slope slightly raised into an obtuse angle; posterior slope carinate and with few or no rays; cardinal teeth erect, rather thick, compressed, crenulate and disposed to be double in both valves; lateral teeth rather short, thick, thickened at the end and somewhat curved; anterior cicatrices distinct and well impressed; posterior cicatrices

distinct and well impressed; dorsal cicatrices placed under the plate behind the cardinal teeth; cavity of the shell very shallow and wide; cavity of the beaks rather shallow and angular; nacre white or yellowish and iridescent.

Remarks.—Several specimens of different ages were received from Professor Tuomey, and a single one from Mr. Thornton. The specimen of the latter is rather more compressed, a little more yellow in the epidermis, and has the teeth and thicker portions of the valves of a yellowish tint. In outline it is near to *rubiginosus* (nobis), and to *Meredithii* (nobis); but it is not sulcate like the latter species, nor are the marks of growth so close, or the posterior slope so high. It is not so triangular as *rubiginosus*, nor is the umbonial slope so angular, neither is it so large a species. The widest of eight specimens before is but 1.7 of an inch. The rays are delicate and of a fine green. In nearly all the specimens the anterior and posterior portions are without rays.

UNIO MODICELLUS. Pl. 57, fig. 172.

Testâ lævi, subobliquâ, inflatâ, posticè subbiangulatâ, inæquilaterali; valvulis suberassis, anticè crassioribus; natibus prominentibus; epidermide vel luteâ vel luteo-olivâ, obsoletè radiatâ; dentibus cardinalibus parvis, compresso-conicis, crenulatis, in utroque valvulo duplicibus; lateralibus curtis, crassis subrectisque; margaritâ albâ, posticè aureâ et iridescente.

Shell smooth, suboblique, inflated, somewhat biangular behind, inequilateral; valves rather thick, thicker before; beaks rather prominent; epidermis yellow or olive yellow, obtusely radiate; cardinal teeth small, compressed conical, crenulate, double in both valves; lateral teeth short, thick and nearly straight; nacre white, golden color behind and iridescent.

Proc. Acad. Nat. Sci. 1859, p. 171.

Hab.—Connasauga River, Bishop Elliott, and Chattanooga River, Georgia, T. Stewardson, M. D.

My cabinet and cabinet of Bishop Elliott.

Diam. .6, Length .8, Breadth 1.1 inch.

Shell smooth, suboblique, somewhat biangular behind and rounded before, slightly impressed before and behind the umbonial slope, inequilateral; substance of the shell rather thick, thicker before; beaks swollen and rather prominent; ligament very short and very light brown; epidermis yellow or olive yellow, very obscurely radiate before the umbonial slope, with distant marks of growth; umbonial slope raised and subbiangular; posterior slope broad, with two raised lines, having a broad furrow between on each valve; cardinal teeth small, compressed conical, crenulate and double in both valves; lateral teeth short, thick and nearly straight; anterior cicatrices confluent and deeply impressed; posterior cicatrices distinct and rather slightly impressed; dorsal cicatrices situated on the underside of the plate posterior to the cardinal tooth; cavity of the shell rather deep and rounded; cavity of the beaks shallow and obtusely angular; nacre white, golden color behind and iridescent.

UNIO HEPATICUS. Pl. 57, fig. 173.

Proc. Acad. Nat. Sci. 1859, p. 154.

Remarks.—I have eight specimens before me, but unfortunately none in alcohol or with perfect beaks. This species belongs to the *complanatus* group, and is perhaps, most nearly allied to *fumatus* (nobis). It is not, however, so thick in the substance of the shell, and it is more biangular and higher in the posterior slope; the color also of the epidermis is not quite so dark. All the specimens before me are more or less purplish in the nacre. Two are somewhat salmon colored in the cavity of the beaks.

The second cardinal tooth in the right valve is very small. In two of the specimens very indistinct rays may be observed; the other six have no trace of them.

UNIO CASTUS. Pl. 57, fig. 174.

Testâ lævi, obliquâ, inflatâ, inæquilaterali, posticè angulatâ, anticè rotundâ; valvulis crassiusculis, anticè crassioribus; natibus subprominentibus; epidermide micante, luteo-viridi, radiatâ; dentibus cardinalibus subgrandibus, compresso-conicis, striatis crenulatisque; lateralibus subbrevis, rectis, lamellatis striatisque; margaritâ albâ et iridescente.

Shell smooth, oblique, inflated, inequilateral, angular behind and round before; valves rather thick, thicker before; beaks rather prominent; epidermis shining, yellowish green and radiated; cardinal teeth rather large, compressed-conical, striate and crenulate; lateral teeth rather short, straight, lamellar and striate; nacre white and iridescent.

Pro. Acad. Nat. Sci. 1860, p. 306.

Hab.—South Carolina. Prof. Tuomey.

My cabinet and cabinet of Dr. Hartman.

Diam. .7,

Length 1.1,

Breadth 1.6 inch.

Shell smooth, oblique, inflated, inequilateral, angular behind and round before; substance of the shell rather thick, thicker before; beaks somewhat prominent; ligament short, thin and dark brown; epidermis yellowish green, shining, radiated, and with distant marks of growth; umbonial slope raised, obtusely angular; posterior slope slightly raised, yellowish with two slightly impressed lines in each valve from the beaks to the posterior margin; cardinal teeth rather large, compressed-conical, striate, crenulate and disposed to be double in both valves; lateral teeth rather short, straight, lamellar and striate; anterior cicatrices distinct and well impressed; posterior cicatrices distinct and moderately well impressed; dorsal cicatrices placed under the plate anterior to the cardinal tooth; cavity of the shell deep and rounded; cavity of the beaks rather shallow and angular; nacre white and iridescent.

Remarks.—A single specimen only is before me. The beaks being eroded, the character of the tips cannot be given. In outline it is nearest to *argenteus* (nobis), and *Ravenelianus* (nobis), but it may at once be distinguished from the former by its being smaller, more inflated, having more distant marks of growth, and in being radiated. From the latter by being smooth in the epidermis, being more inflated and greener, and in having fine green rays over nearly the whole disk. It has much the aspect of *merus* (nobis), the epidermis being nearly the same color, and both having rays; but it differs much in the outline, *merus* not being oblique, but oblong, and rather smaller. I owe to the kindness of Dr. Hartman, of West Chester, Pennsylvania, the possession of the specimen described and figured. He received it from Prof. Tuomey, with only the habitat of South Carolina, so that we do not know in what district or stream exactly it inhabits.

UNIO PERPICTUS. Pl. 58, fig. 175.

Testâ lævi, ellipticâ, subinflâtâ, valdè inæquilaterali, posticè obtusè biangulatâ, anticè rotundatâ; valvulis tenuibus, diaphanus, anticè crassioribus; natibus prominulis, ad apices undulatis; epidermide luteo-olivâ, subnitidâ, undiquè virido-radiatâ; dentibus cardinalibus parvis, erectis, conicis, crenulatis, in utroque valvulo duplicibus; lateralibus longis lamellatis rectisque; margaritâ cæruleo-albâ et valdè iridescente.

Shell smooth, elliptical, somewhat inflated, very inequilateral, obtusely biangular behind and rounded before; valves thin, diaphanous, thicker before; beaks a little prominent and undulate at the tips; epidermis yellowish olive, somewhat shining, with green rays all over; cardinal teeth small, erect, conical, crenulate and double in both valves; lateral teeth long, lamellar and straight; nacre bluish white and very iridescent.

Proc. Acad. Nat. Sci., 1860, p. 306.

Hab.—Bull River, Tennessee, President Estabrook; and Holston River, Dr. Troost. My cabinet.

Diam. .7,

Length 1.2,

Breadth 2.1 inches.

Shell smooth, elliptical, somewhat inflated, very inequilateral, obtusely biangular behind and rounded before; substance of the shell thin, semitransparent, thicker before; beaks a little prominent, with three or four undulations at the tips; ligament rather long, thin and dark brown; epidermis yellowish olive, somewhat shining, with green interrupted rays all over, and with rather distant marks of growth; umbonal slope slightly raised and rounded; posterior slope slightly raised and with numerous small rays; cardinal teeth small, erect, conical, crenulate and double in both valves, in the right valve very slightly so; lateral teeth long, lamellar and straight; anterior cicatrices distinct and well impressed; posterior cicatrices confluent and very slightly impressed; dorsal cicatrices situated on the under side of the plate; cavity of the shell rather shallow and wide; cavity of the beaks very shallow and obtusely angular; nacre bluish white and very iridescent.

Remarks.—There are three specimens before me, received a long time since from President Estabrook, of Knoxville, and Dr. Troost, of Nashville, Tenn. They then seemed to me to belong either to *Prevostianus* (nobis), or to be a variety of *iris* (nobis); but I am now satisfied that they differ specifically from both. It is more transverse than the former and less so than the latter. Two of the specimens are young, and are undulate at the tips. The third, which is figured, is a mature individual from Bull river, and probably as large as it grows. It is somewhat like *scitulus*, herein described, but it is a thinner shell, is more transverse and has the rays more close, more numerous and more interrupted. It also reminds one of *Novi-Eboraci* (nobis), being nearly of the same outline and with very much the same kind of rays.

UNIO LINDSLEYI. Pl. 58, fig. 176.

Testâ lævi, ellipticâ, compressâ, ad latere planulatâ, valde inæquilaterali, posticè subbiangulatâ, anticè obliquè rotundatâ; valvulis suberassis, anticè crassioribus; natibus prominulis; epidermide vel luteâ vel luteo-olivâ, micante, undiquè virido-maculatâ; dentibus cardinalibus parviusculis, compresso-conicis crenulatisque; lateralibus longis, crassis curvisque; margaritâ albâ et iridescente.

Shell smooth, elliptical, compressed, flattened at the sides, very inequilateral, sub-biangular behind, obliquely rounded before; valves rather thick, thicker before; beaks slightly prominent; epidermis yellow or yellowish olive, shining, spotted with green all over; cardinal teeth rather small, compressed-conical and crenulate; lateral teeth long, thick and curved; nacre white and iridescent.

Proc. Acad. Nat. Sci. 1860, p. 306.

Hab.—Tennessee. President Lindsley.

My cabinet and cabinet of President Lindsley.

Diam. .8, Length 1.5, Breadth 2.5 inches.

Shell smooth, elliptical, compressed, flattened at the sides, very inequilateral, sub-biangular behind, obliquely rounded before; substance of the shell rather thick, thicker before; beaks slightly prominent; epidermis yellow or yellowish olive, shining, spotted with green all over and with rather distant lines of growth; ligament long and dark brown; umbonial slope low and flattened; posterior slope very slightly carinate; cardinal teeth rather small, compressed-conical, crenulate and disposed to be double in the right as it is in the left valve; lateral teeth long, thick, curved, much thickened at the posterior end; anterior cicatrices distinct and well impressed; posterior cicatrices confluent and well impressed; dorsal cicatrices placed in a row above the centre of the cavity of the beaks; cavity of the shell very shallow and wide; cavity of the beaks shallow and obtusely angular; nacre white and iridescent.

Remarks.—I have four specimens of this species before me from President Lindsley, of Nashville, but I do not know from what river they were taken in Tennessee. It is a very remarkable species, and perhaps the finest of the group of which *pictus* (nobis) may be considered the type, and to which *Menkianus* (nobis) and *interruptus* (nobis) belong. It differs from *pictus* in being a stouter shell, is not so broad behind nor is it so high in the posterior slope. In the green quadrate spots, which are so remarkable and so beautiful in both species, it differs in having them smaller and perhaps in their being more square. These spots are at the crossing of the rays at the lines of growth, the rays being pale or indistinct from the beaks to the margin. In both there is a slight emargination on the upper portion of the posterior margin. It may at once be distinguished from *interruptus* and *Menkianus* by these two species having broad green rays, which, though partly interrupted by spots, have the rays distinct from the beaks to the margin. One of the four specimens is inclined to put on a yellowish tint in the cavity of the beaks. Neither have the beaks perfect

Remarks.—There are four specimens before me, but neither with perfect beaks. A half grown one is nearly perfect, but not enough so to decide the character of the undulations of the tips. This species belongs to the group of which *clavus*, Lam., may be considered the type. It is not so oblique as that species, but is much more compressed and it more nearly resembles the *patulus* (nobis); but may be distinguished from that species by being more compressed, having the beaks less terminal and less elevated. The rays like the rest of this group are green and liable to be interrupted by the marks of growth. On the posterior slope of the two most perfect specimens there are a few green spots. I owe the possession of this species with others to Mr. Joseph Lesley, who captured it in Kentucky, and I name it after him.

UNIO FUCATUS. Pl. 59, fig. 178.

Testâ lævi, ellipticâ, subinflatâ, valdè inæquilaterali, posticè subbiangulatâ, anticè rotundatâ; valvulis tenuibus, anticè paulisper crassioribus; natibus prominulis, ad apices undulatis; epidermide olivo-luteâ, micante, undiquè virido-maculatâ; dentibus cardinalibus parvis, compresso-conicis, crenulatis, in utroque valvulo duplicibus; lateralibus longis, lamellatis subcurvisque; margaritâ vel cæruleâ vel luteo-albâ et valdè iridescente.

Shell smooth, elliptical, somewhat inflated, very inequilateral, subbiangular behind and rounded before; valves thin, a little thicker before; beaks slightly prominent, undulate at the tips; epidermis olive yellow, shining, spotted with green all over; cardinal teeth small, compressed-conical, crenulate and double in both valves; lateral teeth long, lamellar and somewhat curved; nacre bluish or yellowish white and very iridescent.

Proc. Acad. Nat. Sci. 1860, p. 92.

Hab.—North Alabama, Prof. Tuomey; Tuscumbia, L. B. Thornton, Esq.

My cabinet and cabinets of Mr. Thornton and Mr. Pybas.

Diam. .6, Length 1.2, Breadth 2.1 inches.

Shell smooth, elliptical, somewhat inflated, very inequilateral, subbiangular behind and rounded before; substance of the shell thin, a little thicker before; beaks slightly prominent, undulate at the tips; ligament rather long and dark brown; epidermis olive yellow, shining, spotted with green all over and with distant marks of growth; umbonial slope raised and rounded; posterior slope slightly carinate; cardinal teeth small, compressed-conical, crenulate and double in both valves; lateral teeth long lamellar and somewhat curved; anterior cicatrices distinct and well impressed; posterior cicatrices confluent and slightly impressed; dorsal cicatrices in a row under the plate and across the base of the cardinal tooth; cavity of the shell shallow and wide; cavity of the beaks very shallow and subangular; nacre bluish or yellowish white and very iridescent.

Remarks.—I have seven specimens of this species before me. Two from the late Prof. Tuomey and five from Mr. Thornton. It is closely allied to *pictus* (nobis), and to *ornatus* herein described. I had considered it as a variety of *ornatus*, but I am now satisfied that it is a distinct species. It differs in being thinner and lighter, and in being more inflated as well as in being a smaller species. The small green spots are more frequent and the lines of growth are fewer and more distant. In the lines of growth and some other characters it resembles *camelopardilis* herein described, but it is not so transverse, not quite so much inflated, nor are the spots so large or so square. In outline it is very near to *tener* (nobis). Like all the species of this group while the nacre is generally white throughout, there is a disposition to a yellow tint and sometimes a purplish one, in the thickened parts. Among the seven received one is purplish and two or three yellowish. In some of the specimens there is a slight emargination on the upper portion of the posterior margin.

Remarks.—I received a number of this species from Mr. Thornton, several of which are females and smaller than the males. In outline it is very near to *exiguus* (nobis), but it is rather more oblique, thinner and less polished, some of the specimens being almost striate. The specimen figured is the largest among all those received, and has fine green rays all over the surface of the disk. Some of the specimens are yellowish towards the anterior margin and some are quite green on the posterior half, by the rays closing together and giving that tint to this portion of the epidermis. Two of the specimens are tinted slightly with purple in the teeth and the cavity of the beaks.

UNIO CAMELOPARDILIS. Pl. 59, fig. 180.

Testâ lævi, oblongâ, subinflâtâ, inæquilaterali, posticè obtusè biangulatâ, anticè regulariter rotundatâ; valvulis subtenuibus, anticè crassioribus; natibus prominulis, ad apices rugoso-undulatis; epidermide luteâ, politâ, undiquè virido-maculatâ; dentibus cardinalibus parvis, erectis, compresso-pyramidatis crenulatisque; lateralibus longis, lamellatis subrectisque; margaritâ luteo-albâ et valde iridescente.

Shell smooth, oblong, rather inflated, inequilateral, obtusely biangular behind, regularly rounded before; valves rather thin, thicker before; beaks somewhat prominent, rugosely undulate at the tips; epidermis yellow, polished, spotted with green all over; cardinal teeth small, erect, compressed-pyramidal and crenulate; lateral teeth long, lamellar and nearly straight; nacre yellowish white and very iridescent.

Proc. Acad. Nat. Sci. 1860, p. 92.

Hab.—North Alabama. Prof. Tuomey.

My cabinet.

Diam. .6,

Length 1.1,

Breadth 2 inches.

Shell smooth, oblong, rather inflated, inequilateral, obtusely biangular behind, regularly rounded before; substance of the shell rather thin and semitransparent behind, thicker and obscure before; beaks somewhat prominent, roughly undulate at the tip; ligament rather long and thin; epidermis rather bright yellow, smooth and polished, covered over the whole disk with subquadrate green spots in regular rows, increasing in size from the beaks to the margin, with two distinct distant marks of growth; umbonial slope slightly raised and rounded; posterior slope somewhat carinate and covered with smaller green spots; cardinal teeth small, erect, compressed-pyramidal, disposed to be double in the right, as it is in the left valve; lateral teeth long, lamellar, nearly straight and thickened towards the end; anterior cicatrices distinct and well impressed; posterior cicatrices confluent and slightly impressed; dorsal cicatrices placed on the under side of the plate behind the cardinal tooth; cavity of the shell somewhat deep and rounded; cavity of the beaks rather shallow and subangular; nacre white with a tint of yellow in the cavity and in the teeth, very iridescent.

Remarks.—This is a very striking species. In outline it is near to *paliatus*, Ravenel. In color and in the spots it is near to *pictus* (nobis), but the yellow ground is rather darker and the spots are closer and more quadrate. It may easily be distinguished from *pictus* by its outline being oblong and not elliptical as is the case with that species. It also differs entirely in the lines of growth, there being two distant ones on the *camelopardilis*, while the *pictus* has usually five, which are very much closer. The *pictus* is also of a much more compressed form and much more inequilateral. In the angle of the cardinal teeth they are quite different. This very beautiful species has the most remarkable regularity of green spots which pervade the whole disk. Between the regular rows of spots, very minute capillary lines may be seen

diverging from the beaks to the margin. In all the three specimens before me, the nacre in the thickened parts and in the teeth has a slight tint of gamboge yellow.

UNIO RUTERSVILLENSIS. Pl. 60, fig. 181.

Testâ lævi, transversè ellipticâ, subinflatâ, valdè inæquilaterali, posticè obtusè angulatâ; valvulis subtenuibus, anticè paulisper crassioribus; natibus prominulis, ad apices regulariter et elegantissimè undulatis; epidermide vel fuscâ vel luteo-fuscâ et valdè radiatâ; dentibus cardinalibus parvis, compressis, acuminatis, crenulatis, in utroque valvulo duplicibus; lateralibus longis, lamellatis subcurvisque; margaritâ cæruleo-albâ et valdè iridescentè.

Shell smooth, transversely elliptical, somewhat inflated, very inequilateral, obtusely angular behind; valves rather thin, a little thicker before; beaks a little prominent, regularly and beautifully undulate at the tips; epidermis brown or yellowish brown, and very much rayed; cardinal teeth small, compressed, pointed, crenulate and double in both valves; lateral teeth long, lamellar and slightly curved; nacre bluish white and very iridescent.

Proc. Acad. Nat. Sci. 1859, p. 155.

Hab.—Rutersville, Fayette County, Texas. Prof. C. G. Forshey.

My cabinet and cabinet of Prof. Forshey.

Diam. .8, Length 1.3, Breadth 2.4 inches.

Shell smooth, transversely elliptical, somewhat inflated, very inequilateral, obtusely angular behind; substance of the shell rather thin, a little thicker before, beaks a little prominent, regularly and beautifully undulate at the tips, the undulations being close and parallel, and forming an angle on the middle of the beaks; ligament rather long, somewhat brown; epidermis shining, disposed to be brown towards the beaks and yellow towards the margins, with numerous rays especially on the posterior portion and with distant lines of growth; umbonial slope in the male slightly raised and obtusely angular, in the female very much enlarged and rounded; posterior slope slightly raised, striate, somewhat wrinkled, with one well marked ray on each valve from beak to margin; cardinal teeth small, compressed, pointed, crenulate and double in both valves; lateral teeth long, lamellar and slightly curved; anterior cicatrices distinct and well impressed; posterior cicatrices confluent and very slightly impressed; dorsal cicatrices placed across the centre of the cavity of the beaks; cavity of the shell rather deep and wide; cavity of the beaks rather shallow and subangular; nacre bluish white and very iridescent.

Remarks.—I owe to the kindness of Prof. Forshey a number of this species, but they were generally much broken on their arrival. The one figured is a nearly perfect adult female; the largest is three inches wide. The undulations are remarkably small, regular and parallel; and on the anterior slope they curve from the margin round to the middle of the beak; here they form an angle, by suddenly taking (for a short

distance) a direction nearly parallel with the ligament. The epidermis in most of the specimens before me is of an olive brown on the first stage of growth, and afterwards quite yellow. In some specimens, however, it is dark brown all over. In every case the rays are strong on the posterior half. The males are very like to *U. nasutus*, Say, but are not so transverse nor of so acute an angle on the posterior margin; but the females differ very much, as they are all much inflated on the umbonial slope, and look more like the female of *U. iris* (nobis). The young are more like *U. Texasensis* (nobis), than *nasutus*, but they differ entirely in the form of the undulations of the beaks, the *Texasensis* having a few concentric ones.

UNIO FORSHEYI. Pl. 60, fig. 182.

Testâ valdè et minutè tuberculatâ, subquadrangulâ, compressâ, subæquilaterali, posticè subbiangulatâ; valvulis subcrassis, anticè crassioribus; natibus subelevatis, ad apices acuminatis et elegantissimè perundulatis; epidermide viridi-luteâ, substriatâ, obsoletè radiatâ, submicante; dentibus cardinalibus subgrandibus, erectis, crenulatis, in utroque valvulo duplicibus; lateralibus rectis brevibusque; margaritâ argenteâ et paulisper iridescente.

Shell covered with small tubercles, nearly quadrangular, compressed, nearly equilateral, subbiangular behind; valves rather thick, thicker before; beaks somewhat raised, pointed at the tips and beautifully covered with undulations; epidermis greenish yellow, slightly striate, obscurely rayed and slightly shining; cardinal teeth rather large, erect, crenulate, double in both valves; lateral teeth straight and short; nacre silver white and somewhat iridescent.

Proc. Acad. Nat. Sci. 1859, p. 155.

Hab.—Fayette County, Texas. Prof. C. G. Forshey; and Alabama, J. G. Anthony.

My cabinet and cabinets of Prof. Forshey and Mr. Anthony.

Diam. .8, Length 1.7, Breadth 2 inches.

Shell covered with small tubercles, nearly quadrangular, compressed, nearly equilateral, flattened on the sides, subbiangular behind and rounded before; substance of the shell rather thick, thicker before; beaks somewhat raised, pointed at the tips and beautifully covered with a double row of small angular undulations; ligament small and brown; epidermis greenish-yellow, slightly striate, obscurely rayed and somewhat shining, with distant and rather distinct marks of growth; umbonial slope raised into an angle and furnished with a series of tubercles becoming more distant apart as they recede from the point of the beaks; posterior slope slightly raised, furnished with a series of nearly parallel rows of elongated tubercles passing in curved lines from the umbonial slope to the margin, and with a yellow ray on each valve; anterior slope furnished with nearly parallel rows of tubercles up to the margin; cardinal teeth rather large, erect, crenulate, double in both valves; lateral teeth straight, short and lamellar; anterior cicatrices distinct and well impressed; posterior cicatrices confluent and but

slightly impressed; dorsal cicatrices placed on the under side of the cardinal tooth; cavity of the shell wide and shallow; cavity of the beaks rather deep and angular; nacre silver white and somewhat iridescent.

Soft parts.—*Branchial uterus* was not charged, but ova were in the ovarium. *Branchice* large, very thin, semicircular, inner one very much the larger, free nearly two-thirds the length of abdominal sack. *Palpi* large, thin, subtriangular, united half way down the posterior edges. *Mantle* very thin, thickened on the edges. *Branchial opening* rather large, with numerous small brownish papillæ. *Anal opening* rather small, with smooth edges, devoid of all appearance of papillæ. *Super-anal opening* very large, colored on the inner edges and united below. *Anus* very small; color of the mass dirty white.

Remarks.—I received from Prof. Forshey two perfect specimens, one with the soft parts and several old valves. The one figured is not full grown. It is a very beautiful and interesting species, and very nearly allied to *lacrymosus* (nobis). It differs in having small tubercles, and these are pretty regularly distributed over the whole disk. It is also much more compressed, and the tubercles on the anterior and posterior slopes are more numerous and more regularly placed in rows. In this respect I have seen no *Unio* so ornate. It also has a close resemblance to a half grown *U. Blandianus* (nobis), but is more compressed and has more and smaller tubercles. The interior is remarkably white, and the surface of the nacre down the medial portion is beautifully waved by the tubercles on the exterior.

The specimen from Mr. Anthony is higher on the umbonial slope, where it is more corrugate and the posterior slope also is higher.

I dedicate this species to Prof. Forshey, who has done much to elucidate the Natural History of the Southern States.

UNIO HOUSTONENSIS. Pl. 60, fig. 183.

Testâ lævi, subrotundâ, subinflâtâ, æquilaterali, ad latere paulisper planulatâ; valvulis subcrassis, anticè crassioribus; natibus elevatis, ad apices paulisper undulatis; epidermide lævi, luteo-fuscâ, vel eradiatâ vel obsoletè radiatâ; dentibus cardinalibus magnis, erectis, crenulatis; lateralibus curtis subrectisque; margaritâ argenteâ et iridescente.

Shell smooth, nearly round, somewhat inflated, equilateral, a little flattened on the side; valves rather thick, thicker before; beaks raised, slightly undulate at the tips; epidermis smooth, yellowish brown without rays or obscurely rayed; cardinal teeth large, erect and crenulate; lateral teeth short and straight; nacre silvery white and iridescent.

Proc. Acad. Nat. Sci. 1859, p. 155.

Hab.—Houston, F. Moore, M. D.; and Rutgersville, Texas, Prof. Forshey.

My cabinet and cabinets of Dr. Moore and Prof. Forshey.

Diam. 1.1,

Length 1.3,

Breadth 1.3 inch.

Shell smooth, nearly round, somewhat inflated, equilateral, slightly flattened over the side and subemarginate at base; substance of the shell somewhat thick, thicker before; beaks raised, with two or three rather large irregular undulations at the tips; ligament short, rather thick and light brown; epidermis smooth, striate on the anterior slope, yellowish brown, without rays or obscurely rayed, with very distant marks of growth; umbonal slope raised into a very obtuse angle; posterior slope very slightly raised; with two or three obscure rays on each valve from beak to posterior margin; cardinal teeth large, erect, crenulate, and disposed to be double in the right as it is in the left valve; anterior cicatrices distinct and well impressed; posterior cicatrices nearly distinct; dorsal cicatrices placed on the underside of the cardinal teeth; pallial cicatrix well impressed; cavity of the shell shallow and rounded; cavity of the beaks deep and angular; nacre silvery white and iridescent.

Soft parts.—*Branchial uterus* was not charged in any of the four specimens in alcohol, but all had ova in the ovarium. *Branchiæ* rather small, semicircular, inner ones the larger, free more than one half the length of the abdominal sack. *Pulpi* large, subtriangular, united half way down the posterior edges. *Mantle* very thin, with broad thickened edges. *Branchial opening* rather large, with a few very large brown papillæ on the inner edges. *Anal opening* small, apparently without papillæ. *Super-anal opening* long, slightly united below; color of the mass whitish.

Remarks.—I owe to the kindness of Dr. Moore, of Houston, the possession of two specimens of the same size. They are young and probably only half grown. Subsequently I received four specimens from Prof. Forshey, one of which is adult. This species is very nearly allied to *U. petrinus*, Gould. It differs in the beaks and posterior slope which are not corrugate, simply having two or three folds at the tips. It is not so high on the posterior slope, nor are the marks of growth so strongly exhibited. In one shell there is a flattening before the umbonal slope, while in the *petrinus* that part is rounded. It belongs to the group of which *U. circulus*, (nobis), may be considered the type. The specimens from which the description is made are very symmetrical in outline and thickness. They differ somewhat in the color of the epidermis, the younger ones being greenish yellow. On one of these, very obscure rays may be seen while the other is devoid of them. The older ones are olive brown, and are without rays. The smallest is 1.1 of an inch wide; the largest 1.9 of an inch.

UNIO TEXASENSIS. Pl. 61, fig. 184.

Testâ lævi, ellipticâ, subcompressâ, valdè inæquilaterali, posticè subangulatâ; valvulis subtenuibus, anticè crassioribus; natibus prominulis, ad apices pereleganter et subconcentricè undulatis; epidermide tenebroso-olivâ, politâ, obsoletè radiatâ; dentibus cardinalibus parvis, compressis, erectis crenulatisque; lateralibus longis, lamellatis subcurvisque; margaritâ cæruleâ et valdè iridescente.

Shell smooth, elliptical, subcompressed, very inequilateral, subangular behind; valves rather thin, thicker before; beaks slightly prominent, very beautifully and

subconcentrically undulate at the tips; epidermis dark olive, shining, obsoletely rayed; cardinal teeth small, erect and crenulate; lateral teeth long, lamellar and somewhat curved; nacre bluish and very iridescent.

Proc. Acad. Nat. Sci. 1857, p. 84.

Hab.—Dewitt County, Texas. W. Newcomb, M. D.

My cabinet and cabinet of Dr. Newcomb.

Diam. .5, Length .8, Breadth 1.4 inch.

Shell small, elliptical, subcompressed, very inequilateral, subangular behind and rounded before; substance of the shell rather thin, thicker before; beaks slightly prominent, very beautifully and subconcentrically undulate at the tips; ligament small, thin and yellowish brown; epidermis dark olive, shining, obsoletely rayed, with distant marks of growth; umbonial slope slightly raised and obtusely angular; posterior slope very slightly raised, with two dark lines on each valve from the beaks to the posterior margin; cardinal teeth small, erect and crenulate; lateral teeth long, lamellar and somewhat curved; anterior cicatrices distinct, small and well impressed; posterior cicatrices confluent and slightly impressed; dorsal cicatrices placed across the cavity of the beaks; cavity of the shell somewhat deep and wide; cavity of the beaks shallow and obtusely angular; nacre bluish and very iridescent.

Remarks.—Several specimens were sent to me by Dr. Newcomb, of Albany, N. Y. It is a small species near to *parvus*, Bar., but it is more oblique, more compressed, has a shining epidermis and has more and smaller undulations at the tips. It is very much like *U. Bairdianus* (nobis), herein described, and may prove to be the male of that species.

UNIO QUADRANS. Pl. 61, fig. 185.

Testâ lævi, quadratâ, valdè ventricosâ, subæquilaterali, posticè obtusè angulatâ, anticè subtruncatâ; valvulis crassis, anticè paulisper crassioribus; natibus elevatis, tumidis; epidermide tenebroso-fuscâ, radiatâ, transversè striatâ; dentibus cardinalibus magnis, valdè compressis, striatis crenulatisque; lateralibus longis, crassis curvisque; margaritâ albâ et iridescente.

Shell smooth, quadrate, very much inflated, nearly equilateral, obtusely angular behind and subtruncate before; valves thick, somewhat thicker before; beaks raised and swollen; epidermis dark brown, without rays, transversely striate; cardinal teeth large, very much compressed, striate and crenulate; lateral teeth long, thick and curved; nacre white and iridescent.

Proc. Acad. Nat. Sci. 1860, p. 306.

Hab.—Texas. C. M. Wheatley.

Cabinet of Mr. Wheatley.

Diam. 2, Length 2.8, Breadth 3.6 inches.

Shell smooth, quadrate, very much inflated, nearly equilateral, obtusely angular behind and subtruncate before; substance of the shell thick, somewhat thicker

before; beaks raised and swollen and nearly medial; ligament rather long, thick and brown; epidermis dark brown, nearly black, without rays and transversely striate, with distant lines of growth; umbonial slope much raised and obtusely angular; posterior slope slightly raised and broad; cardinal teeth large, very much compressed, quite lamellar, striate, crenulate, double in the right and single in the left valve; lateral teeth long, thick, crenulate and curved; anterior cicatrices confluent and deeply impressed; posterior cicatrices confluent and slightly impressed; dorsal cicatrices placed in the centre of the cavity of the beaks; cavity of the shell very deep and rounded; cavity of the beak shallow and rounded; nacre white and iridescent.

Remarks.—Mr. Wheatley procured but a single specimen of this fine species. The beaks being very much eroded, it is impossible to say if the tips be undulate. It is nearly allied to *Berlandierii* (nobis), but is more quadrate, has a dark epidermis without rays, and the cardinal teeth are more lamellar and longer. The beaks are also more medial. The *Berlandierii* is usually pinkish in the nacre, while the specimens from which this description is made is of a remarkably pure white.

It is worthy of remark that the outline, inflation, position of the beaks, color and roughness of the epidermis and thickness of the substance of the shell in this species is so much like a specimen of *Anodonta rotunda*, Spix, sent to me by D'Orbigny, that, lying side by side, any one would say they were of the *same species*, while *U. quadrans* has very large perfectly developed cardinal and lateral teeth, and *A. rotunda* is of course without any. It is very likely that when perfect specimens of both shall be observed, that they will be found to differ in the undulations of the beaks.

UNIO BAIRDIANUS. Pl. 61, fig. 186.

Testâ lævi, ellipticâ, paulisper inflatâ, posticè compressâ, valdè inæquilaterali; valvulis subtenuibus, posticè crassioribus; natibus prominulis, ad apices concentricè undulatis; epidermide tenebroso-fuscâ, obsoletè radiatâ; dentibus cardinalibus parvis, erectis, acuminatis crenulatisque; lateralibus longis, lamellatis subcurvisque; margaritâ albâ et valdè iridescente.

Shell smooth, elliptical, slightly inflated, compressed behind, very inequilateral; valves rather thin, thicker before; beaks slightly prominent, concentrically undulate at the tips; epidermis dark brown, obsoletely radiate; cardinal teeth small, erect, acuminate and crenulate; lateral teeth long, lamellar and somewhat curved; nacre white and very iridescent.

Proc. Acad. Nat. Sci. 1857, p. 102.

Hab.—Devil's River, Texas: Capt. Pope, U. S. A.

My cabinet and cabinets of the Smithsonian Institution and J. G. Anthony.

Diam. .4, Length .7, Breadth 1.2 inches.

Shell smooth, elliptical, slightly inflated, compressed behind, very inequilateral; substance of the shell rather thin, thicker before; beaks slightly prominent, concentrically undulate at the tips; ligament small, thin and yellowish brown; epidermis dark brown, obsoletely radiate and with distant marks of growth; umbonial slope slightly raised and obtusely angular; posterior slope very slightly raised, with two dark lines on each valve from the beaks to the posterior margin; cardinal teeth small, erect, acuminate; crenulate and double in both valves; lateral teeth long, lamellar and somewhat curved; anterior cicatrices distinct, small and somewhat impressed; posterior cicatrices confluent and slightly impressed; dorsal cicatrices placed across the cavity of the beaks, cavity of the shell small and wide; cavity of the beaks very shallow and obtusely angular; nacre white and very iridescent.

Remarks.—Several specimens were in the collection brought by Capt. Pope. This species is nearly allied to *parvus*, Bar., but it is more compressed, of a finer and smoother epidermis, and the undulations of the beaks are smaller and more numerous, the beaks being nearer to the anterior margin. The figure is made from a female, and it is possible that it may prove to be female of *Texasensis*, described in this paper. A large male specimen from Mr. Anthony for examination was labelled "Mississippi."

ANODONTA LEWISII. Pl. 62, fig. 187.

Testâ lævi, ellipticâ, subventricosâ, inæquilaterali, posticè obtusè angulatâ, anticè rotundatâ; valvulis sub-
tenuibus; natibus prominulis, ad apices rugoso-undulatâ; epidermide tenebrosâ-olivaceâ, eradiatâ;
margaritâ cæruleo-albâ et iridescente.

Shell smooth, elliptical, subventricose, inequilateral, obtusely angular behind and rounded before; valves rather thin; beaks a little prominent, roughly undulate at the tips; epidermis dark olive, eradiate; nacre bluish white and iridescent.

Proc. Acad. Nat. Sci. 1857, p. 84.

Hab.—Erie Canal and Mohawk River, Herkimer County, N. Y., James Lewis, M. D.; and Genesee River, below Rochester, Prof. C. Dewey.

My cabinet and cabinets of Dr. Lewis and Prof. Dewey.

Diam. 1.1,

Length 1.7,

Breadth 3.2 inches.

Shell smooth, elliptical, rather inflated, inequilateral, obtusely angular behind and obliquely rounded before; substance of the shell rather thin, very slightly thickened on the anterior basal margin; beaks a little prominent, roughly undulate in a double series at the tips; ligament rather long, somewhat thick and dark brown; epidermis dark olive, without rays or very obscurely rayed, with very distant marks of growth; umbonial slope raised and rounded; posterior slope raised into a well defined carina, with two impressed lines on each valve from the beaks to the margin; anterior cicatrices confluent, large, slightly impressed; posterior cicatrices confluent very large and very slightly impressed; dorsal cicatrices placed in the centre of the cavity of the

beaks; cavity of the shell deep and wide; cavity of the beaks very shallow and subangular; nacre bluish white and iridescent.

Soft Parts.—*Branchial uterus* filled the whole length of the outer branchiæ very much like *fluviatilis*. *Branchiæ* rather large, rounded below, inner one much the larger, free two thirds the length of the abdominal sack. *Pulpi* not large, subtriangular, united a short distance on the posterior edges. *Mantle* thin, transparent, thickened at the edges, and colored blackish and brown at syphonal openings. *Branchial opening* with rather delicate and slender papillæ, which are light brown and yellowish, surrounded with a black pigment. *Anal opening* small, maculate with light brown, and black within the edges, the edges being black. *Super-anal opening* rather large, distant from anal opening, slightly colored on the edges and united below for some distance. Color of the mass whitish, in some cases a little salmon colored.

Embryonic shell light brown, triangular, with hooks.*

Out of 40 opened in April only three had any living young in the branchial uterus. They remained in the anterior part of the outer branchiæ. In a few days these would have been discharged. It is evident, however, that the whole length of the outer branchiæ had been charged as in *fluviatilis*. On examination of the ovaria, I found several females with incipient ova, but nearly all which were examined proved to be males.

Remarks.—Among the large number of fine fresh water shells sent to me by my friend Dr. Lewis from time to time, were living specimens of all ages of this species, which had not been before noticed, and it is with peculiar pleasure that I have dedicated it to one who has done so much and so judiciously in this branch of Malacology in his own State. This species is closely allied to *fluviatilis*, Sol., as it is also to *lacustris* herein described. It differs from the first in the form of the undulations of the beaks as well as in the color of the epidermis, it being very much darker. It differs from *lacustris* in being darker and not banded and in having rugose, granular indications on the tips. It is also more swollen about the middle of the disk than either of these species.

ANODONTA LACUSTRIS. Pl. 62, fig. 188.

Testâ lævi, transversâ, subinflatâ, valdè inæquilaterali, posticè subangulatâ; valvulis tenuibus; natibus prominulis, ad apices crebri undulatis; epidermide luteo-olivaceâ, vel èradiatâ vel obsoletè radiatâ, transversè vittatâ; margaritâ vel albâ vel croceâ et iridescente.

Shell smooth, transverse, somewhat inflated, very inequilateral, subangular behind; valves thin; beaks slightly prominent, closely undulate at the tips; epidermis yellowish olive, eradiate or obsoletely radiate, transversely banded; nacre white or reddish brown and iridescent.

Proc. Acad. Nat. Sci. 1857, p. 84.

*See description and figure, Jour. Acad. Nat. Sci. vol. iv. p. 49, and Obs. on Unio, vol. vi. p. 49.

Hab.—Crooked Lake and Little Lakes, New York. James Lewis, M. D.

My cabinet and cabinet of Dr. Lewis. Mohawk, N. Y.

Diam. 1·1,

Length 1·7,

Breadth 3·3 inches.

Shell smooth, transverse, somewhat inflated, very inequilateral, subangular behind; substance of the shell thin; beaks slightly prominent, with numerous closely set, irregular undulations at the tips; ligament long, thin and dark brown; epidermis yellowish olive, without rays or obscurely rayed, transversely banded; umbonial slope raised and rounded; posterior slope carinate, rather wide, with two slightly impressed and three dark lines from the beaks to the margin on each valve; anterior cicatrices confluent, large and slightly impressed; posterior cicatrices confluent, large and very slightly impressed; dorsal cicatrices placed in the centre of the cavity of the beaks; cavity of the shell rather deep and wide; cavity of the beaks very shallow, scarcely perceptible; nacre bluish white or reddish brown and iridescent.

Soft parts.—*Branchial uterus* enormously filled the whole length of the outer branchiæ, being a light brown. *Branchiæ* very large, inner one the larger, slightly curved below, free nearly the whole length of abdominal sack. *Palpi* very large, subangular, united one-third down the posterior edges. *Mantle* thickened along the margin. *Branchial opening* large, with minute light colored papillæ on the edges. *Anal opening* rather small, brownish, without papillæ. *Super-anal opening* rather small, edge colored, united below for some distance; color of the mass dirty white.

Embryonic shell light brown, triangular, with hooks, very like to *Lewisii*, (nobis). Journ. Acad. Nat. Sci. vol. iv. p. 49, and Obs. on Unio, vol. vi. p. 49.

Remarks.—Dr. Lewis most kindly sent me many living specimens of all ages of this species which had not been before noticed. It is near to *fragilis*, Lam. and *Footiana*, (nobis), but may easily be distinguished from either. In outline it very closely resembles *fluviatilis*, Sol., but it differs from that species in the undulations of the beaks. Some specimens have obscure green rays, but usually they are without rays. The interior, and especially towards the cavity of the beaks have a thickening, sometimes incrustated, arising probably from a diseased condition, which is somewhat peculiar to the specimens of this species sent by Dr. Lewis. He mentions in his letter that *U. radiatus* and *An. lacustris* are all the species which are found in "Little Lakes." *U. complanatus* grows in the outlet of Schuyler's Lake, but not in the lake nor in "Little Lakes.

ANODONTA MODESTA. Pl. 63, fig. 189.

Testâ lævi, ellipticâ, subinflatâ, valdè inæquilateralî, subemarginatâ, anticè obtusè angulatâ; valvulis subcrassis, posticè crassioribus; natibus subprominentibus, ad apices undulatis; epidermide olivaceâ, transversè vittatâ et obsoletè radiatâ; margaritâ cæruleo-albâ et valdè iridescente.

Shell smooth, elliptical, somewhat inflated, very inequilateral, subemarginate, ob-

tusely angular before; valves rather thick, thicker before; beaks slightly prominent, undulate at the tips; epidermis olivaceous, transversely banded and obscurely radiate; nacre bluish white and very iridescent.

Proc. Acad. Nat. Sci. 1857, p. 84.

Hab.—Pond near Kalamazoo, Michigan. J. Lewis, M. D.

My cabinet.

Diam. .7,

Length .9,

Breadth 1.8 inches.

Shell smooth, elliptical, somewhat inflated, very inequilateral, subemarginate, obtusely angular before; substance of the shell rather thick, thicker before; beaks slightly prominent, with a few small, irregular undulations at the tips; ligament rather long, thin and light brown; epidermis dark olive color, transversely banded, obscurely radiate, with distant well marked lines of growth; umbonial slope raised and obtusely angular; posterior slope slightly raised, with three obscure rays from the beaks to the margin on each valve; anterior cicatrices confluent, small and slightly impressed; posterior cicatrices confluent and very slightly impressed; dorsal cicatrices placed in the upper part of the cavity of the beaks; cavity of the shell rather deep and wide; cavity of the beaks very shallow and obtusely angular; nacre bluish white and very iridescent.

Remarks.—Only a single specimen was received by Dr. Lewis, and I owe to his kindness the possession of it. It is near to *Ferussaciana* (nobis), but differs in outline and in the beaks, and it is also a thicker shell. It has also some resemblance to *subcylindracea*, (nobis), but is not so transverse and is smaller.

ANODONTA DANIELSII. Pl. 63, fig. 190.

Testâ lævi, ellipticâ, compressâ, posticè obtusè angulatâ, valdè inæquilaterali; valvulis subtenuibus; natibus prominulis, ad apices undulatis; epidermide tenebroso-fusâ, micante, obsoletè radiatâ; margaritâ cæruleo-albâ et iridescente.

Shell smooth, elliptical, compressed, obtusely angular behind, very inequilateral; valves rather thin; beaks a little prominent, undulate at the tips; epidermis dark brown, shining, obscurely radiate; nacre bluish white and iridescent.

Proc. Acad. Nat. Sci., 1858, p. 139.

Hab.—Topeka, Kansas. Prof. Edward Daniels.

My cabinet.

Diam. 1.3,

Length 2.1,

Breadth 3.9 inches.

Shell smooth, elliptical, compressed, obtusely angular behind, very inequilateral; substance of the shell rather thin; beaks a little prominent, undulate in a double series at the tips; ligament rather long and large; epidermis dark brown, shining, obscurely rayed and with very distant marks of growth; umbonial slope very much inflated and rounded; posterior slope somewhat raised, dark brown, with two obscure

displayed in a double row on each. In outline it closely resembles *Trautwiniana* (nobis), from Carthagera, but it is not so compressed, so thick, nor so dark a shell.

In the young of many *Anodontæ*, there is a slight disposition towards both cardinal and lateral teeth of an indistinct lamellar structure. This may be perceived on nearly all the young *decora*. In the specimen of *Texasensis* before me this character is well marked, the cardinal tooth in the left valve being distinctly raised and separated into two divisions.

UNIO EIGHTSI. Pl. 64, fig. 192.

Testâ plicatâ, quadratâ, subcompressâ, maximè undulatâ usque at natium apices, valdè inæquilaterali; valvulis crassissimis, anticè crassioribus; natibus elevatis, compressis, ad apices rugoso-undulatis; epidermide tenebroso-fuscâ, eradiatâ, striatâ; dentibus cardinalibus magnis, crassis et valdè striatis; laterali-bus longis, crassis, lamellatis subcurvisque; margaritâ albâ et valdè iridescente.

Shell plicate, quadrate, rather compressed, very much undulated even to the tips of the beaks, very inequilateral; valves very thick, thicker before; beaks raised, compressed and rugosely undulate at the tips; epidermis dark brown, eradiate and striate; cardinal teeth large, thick and very much striate; lateral teeth long, thick, lamellar and somewhat curved; nacre white and very iridescent.

Proc. Acad. Nat. Sci. 1860, p. 306.

Hab.—Texas and in Sabinas River, New Leon, Mexico. James Eights, M. D.

My cabinet and cabinet of the Smithsonian Institution.

Diam. 1·8,

Length 3·3,

Breadth 4·6 inches.

Shell plicate, quadrate, rather compressed, very much undulated even to the tips of the beaks, anterior portion only free from undulations, very inequilateral; substance of the shell very thick, thicker before; beaks raised, compressed and rugosely undulate at the tips; ligament very long, thick and dark brown; epidermis dark brown, without rays, striate, with rather distant lines of growth; umbonial slope but slightly raised and obliquely traversed by undulations increasing in size towards the margin; posterior slope raised into a high carina and covered with nearly parallel rib-like undulations to the margin; cardinal teeth large, thick, somewhat raised and very rugosely striate; lateral teeth long, thick, lamellar and somewhat curved; anterior cicatrices distinct, very large, very much corrugate and very deeply impressed; posterior cicatrices confluent, very large and slightly impressed; dorsal cicatrices placed on the underside of the plate and on the base of the cardinal tooth; pallear cicatrix very deeply impressed and distant from the margin; cavity of the shell rather shallow and very wide; cavity of the beaks very deep and angular, nacre white and very iridescent.

Remarks.—Several specimens were brought by Dr. Eights, of Albany, from the two habitats mentioned, and I owe the possession of a specimen to him and one to the

Institution. The description, therefore, cannot be said to be perfect. The beak is too much eroded to display any undulations which probably existed there. It reminds one of a young, inflated *ligamentinus*, Lam., also of *venustus* (nobis) and *zig-zag* (nobis). In outline it is very nearly the same as the two first, but is not quite so wide in the axis major. In outline it is more elliptical than *zig-zag*, and the rays are different, being more like *venustus* and *ligamentinus*. This is another of the new molluscs which the Smithsonian owes to the liberality of Lieut. Couch of the U. S. Army.

UNIO BERLANDIERII. Pl. 65, fig. 194.

Testâ lævi, subquadrata, inflatâ, posticè subrotundâ, inæquilaterali; valvulis crassis, anticè crassioribus; natibus grandibus, elevatis, tumidis, ad apices minutè undulatis; epidermide micante, tenebroso-fuscâ, obsoletè radiatâ; dentibus cardinalibus magnis, erectis, subcompressis, valdè crenulatis et in utroque valvulo duplicibus; lateralibus longis, crassis, subcurvis lamellatisque; margaritâ vel purpurascente vel salmonis colore tinctâ et iridescente.

Shell smooth, subquadrate, inflated, rounded behind, inequilateral; valves thick, thicker before; beaks large, elevated, minutely undulate at the tips, swollen; epidermis shining, dark brown, obscurely radiated; cardinal teeth large, erect, subcompressed, very crenulate and double in both valves; lateral teeth long, thick, somewhat curved and lamellar; nacre either purple or tinted with salmon color and iridescent.

Proc. Acad. Nat. Sci., 1857, p. 101.

Hab.—Matamoras and Tamaulipas, Mexico, Lewis Berlandier, M. D.; Colorado River, Texas, Prof. Forshey.

My cabinet and cabinets of Smithsonian Institution and Prof. Forshey.

Diam. 1·7,

Length 2·5,

Breadth 3·4 inch.

Shell smooth, subquadrate, inflated, rounded behind, inequilateral; substance of the shell thick, thicker before; beaks large, raised, minutely undulate at the tips and swollen; ligament rather short, thick and dark brown; epidermis shining, dark brown, obscurely radiated, with distant brown bands of growth; umbonial slope rounded and inflated; posterior slope wide, rather depressed, with three greenish lines on each valve from the beaks to the margin; cardinal teeth large, erect, rather compressed, very crenulate and double in both valves; lateral teeth long, thick, somewhat curved and lamellar; anterior cicatrices distinct, large, and well impressed; posterior cicatrices confluent, very large and slightly impressed; dorsal cicatrices well impressed and placed across the cardinal tooth and on the under side of the plate; cavity of the shell very deep and rounded; cavity of the beaks very deep and obtusely angular; nacre either purple or tinted with salmon color and iridescent.

Soft Parts.—*Branchial uterus* filled through the whole length of the outer branchiæ. *Branchiæ* rather large, quite semicircular, inner ones somewhat the larger, free at the

point of the abdominal sack only.* *Pulpi* very large, subelliptical and united nearly half way down the posterior edges. *Mantle* rather thin, a little thickened above the lower edges. *Branchial opening* with papillæ on the inner side, a row of which latter, diminished in size and wider apart, extends round the basal margin. *Anal opening* small, with small papillæ on the inner edges. *Super-anal opening* very long, edges sharp, united at the lower part. *Anus* crenulate on the edge. The mass seems as if it had been whitish, but the specimens have been so long in alcohol that they have become brownish and discolored. The ova were in the branchial uterus, but not developed so as to give the embryonic form.

Remarks.—There were many specimens in the collection made by Dr. Berlandier, which was purchased by Lieut. D. N. Couch, U. S. A., and liberally presented to the Smithsonian Institution. This species is near to *Tecomatensis* (nobis), but is not quite so oblique. The young are nearly quadrate and some are beautifully furnished with green rays over a yellowish ground. The description is made from an adult, and they are usually dark brown with a few obscure rays. Some of the young have a carina rising almost into a wing. There are two or three minute undulations at the tips of the beaks. In the left valve the teeth have a disposition to be tripartite. It is probable this species may be found in Texas also. I have peculiar pleasure in dedicating this fine shell to the late Dr. Berlandier, who many years since devoted much time, with great success, to the Natural History of Northern Mexico. I am greatly indebted to the liberality of the officers of the Smithsonian Institution, for the privilege of describing this and many other new forms in this collection.

UNIO SALADOENSIS. Pl. 65, fig. 195.

Testâ lævi, obovatâ, inflatâ, inæquilaterali, posticè et anticè rotundatâ; valvulis subtenuibus, anticè paulisper crassioribus; natibus prominulis, lævibus; epidermide luteo-olivâ, politâ radiatâque; dentibus cardinalibus parvis, lamellatis, obliquis; lateralibus sublongis, lamellatis subcurvisque; margaritâ cæruleo-albâ et iridescente.

Shell smooth, obovate, inflated, inequilateral, rounded behind and before; valves rather thin, slightly thicker before; beaks slightly prominent, smooth; epidermis yellowish olive, polished and rayed; cardinal teeth small, lamellar and oblique; lateral teeth rather long, lamellar and somewhat curved; nacre bluish white and iridescent.

Proc. Acad. Nat. Sci. 1860, p. 305.

Hab.—Rio Salado, New Leon, Mexico. L. Berlandier, M. D.

Cabinet of the Smithsonian Institution.

Diam. .5,

Length .8,

Breadth 1.2 inch.

Shell smooth, obovate, inflated, inequilateral, rounded behind and before; substance of the shell rather thin, slightly thicker before; beaks slightly prominent, smooth

*Four specimens since received from Prof. Forshey have no opening at the end of the abdominal sack like those from Matamoras.

Remarks.—A single specimen only has been received by the Smithsonian Institution among the shells collected by Dr. Berlandier, and presented by Lieut. Couch. This individual is, I think, the young or about the half-grown of a small species. It is nearer in outline and in the color and smoothness of its epidermis, as well as in its rays, to *U. amygdalum* (nobis), than to any other species I am acquainted with; but it may at once be distinguished by its outline approaching more to rotundity. The nacre also differs in being less pearly. The beaks are remarkable for being entirely without any undulation of any kind, at least this specimen has no appearance of them.

Testâ lævi, quadratâ, inflatâ, biemarginatâ, ad latere sulcatâ, inæquilaterali, posticè biangulatâ, anticè rotundâ; valvulis crassis, anticè crassioribus; natibus prominentibus; epidermide olivo-fuscâ, striatâ, eradiatâ; dentibus cardinalibus subgrandibus, erectis, rugoso-striatis, crenulatis; lateralibus sublongis, crassis curvisque; margaritâ argenteâ et valdè iridescente.

Proc. Acad. Nat. Sci. 1860, p. 305.

My cabinet and cabinet of Smithsonian Institution.

Shell smooth, quadrate, inflated, biemarginate, furrowed on the side, inequilateral, biangular behind, round before; substance of the shell thick, thicker before; beaks prominent, inflated; ligament rather short and thick; epidermis olive brown, striate, without rays and with rather distant marks of growth; umbonial slope biangular and flattened; posterior slope wide, raised into an angular carina, with an unequal impressed line in each valve from the beaks to the posterior margin; cardinal teeth rather large, erect, rugosely striate, crenulate, thick and disposed to be trifid in the right valve; lateral teeth rather long, thick and curved; anterior cicatrices distinct and very deeply

impressed; posterior cicatrices distinct and well impressed; dorsal cicatrices placed under the plate between the cardinal and lateral teeth; pallear cicatrices well impressed; cavity of the shell deep and rounded; cavity of the beaks deep and angular; nacre silvery white and very iridescent.

Remarks.—Half a dozen odd valves only were sent to me by the Smithsonian Institution for examination. It reminds one of several very different species. In outline its quadrate form is almost identical with *asperrimus* (nobis); but it has no tubercles; in its emargination at base and on the posterior margin it resembles *biemarginatus* (nobis); in the epidermis, thickness and general aspect it reminds one of *Houstonensis* (nobis), as well also *petrinus* Gould, but it is not rotund like those species, and the lines of growth are closer. Some of the specimens are not so emarginate as that figured. None were perfect enough to show the undulations of the beaks. Some of the valves had small undulations on the posterior slope.

This is one of the shells which Lieut. D. N. Couch, U. S. A. procured from Dr. Berlandier's collection, and presented to the Smithsonian Institution. I name it after him with great pleasure.

UNIO POPEII. Pl. 66, fig. 197.

Testâ lævi, transversâ, compresso-cylindraceâ, ad basim subemarginatâ, valdè inæquilaterali, ad latere planulatâ, posticè truncatâ; valvulis subtenuibus, anticè crassioribus; natibus parvis, prominulis, ad apices granulatis; epidermide vel tenebroso-olivâ vel fuscâ, obsoletè radiatâ; dentibus cardinalibus compressis, erectis, acuminatis crenulatisque; lateralibus prælongis, lamellatis subrectisque; margaritâ vel albâ vel salmonis colore tinctâ et iridescente.

Shell smooth, transverse, compresso-cylindrical, subemarginate at base, very inequilateral, flattened at the side and truncate behind; valves rather thin; thicker before; beaks small, slightly prominent, granulate at the tips; epidermis dark olive or brown and obscurely radiate; cardinal teeth compressed, erect, acuminate and crenulate; lateral teeth very long, lamellar and nearly straight; nacre white or tinted with salmon color and iridescent.

Proc. Acad. Nat. Sci. 1857, p. 102.

Hab.—Devil's River, Texas, and Rio Salado, New Leon, Mexico, Capt. Pope, U. S. A.

My cabinet and cabinet of Smithsonian Institution.

Diam. .6, Length 1.1, Breadth 2.3 inches.

Shell smooth, transverse, compresso-cylindrical, subemarginate at base, very inequilateral, flattened at the sides and truncate behind; substance of the shell rather thin, thicker before; beaks small, slightly prominent, granulate at the tips and nearly terminal; ligament long and rather thin; epidermis dark olive or brown, obscurely radiate and with rather close lines of growth; umbonial slope slightly raised and obscurely angular; posterior slope raised into a carina and with two impressed lines

from the tips to margin on each valve; cardinal teeth compressed, erect, acuminate and crenulate; lateral teeth very long, lamellar and nearly straight; anterior cicatrices distinct, moderately small and well impressed; posterior cicatrices confluent and somewhat impressed; dorsal cicatrices placed in the centre of the cavity of the beaks; cavity of the shell shallow and wide; cavity of the beaks very shallow and obtusely angular; nacre white or tinted with salmon color and iridescent.

Remarks.—Only two perfect specimens were sent to me for examination by the Smithsonian Institution, neither with the soft parts. In outline it is closely allied to *U. Poeyanus* (nobis), but differs in the beaks, in being of a darker color and in the epidermis being striate, while the *Poeyanus* is minutely granulate. I name the species after Capt. Pope, who collected this with other species during an expedition in New Leon, Mexico.

ANODONTA HENRYANA. Pl. 66, fig. 198.

Testâ lævi, oblongâ, inflatâ, ad basim et anticè compressâ, subæquilaterali, posticè truncatâ; valvulis per-tenuibus; natibus depressis, planulatis, ad apices minutè et irregulariter undulatis; epidermide niti-dâ, vel luteâ vel luteo-viridi, obsoletè radiatâ et vittatâ; margaritâ cæruleo-albâ et valdè iridescente.

Shell smooth, oblong, inflated, compressed at the base and before; nearly inequi-lateral, truncate behind; valves very thin; beaks depressed, flattened, minutely and irregularly undulate at the tips; epidermis bright, yellow or yellowish green, obsoletely rayed and banded; nacre bluish white and very iridescent.

Proc. Acad. Nat. Sci. 1857, p. 102.

Hab.—Matamorâs and Tamaulipas, Mexico. L. Berlandier, M. D.

My cabinet and cabinet of Smithsonian Institution.

Diam. 1, Length 1.5, Breadth 2.8 inches.

Shell smooth, oblong, inflated, compressed at the base and before, nearly equilateral, truncate behind and obtusely angular before; substance of the shell very thin, sub-transparent; beaks depressed, flattened, minutely and irregularly undulate at the tips; ligament very long, thin and light brown; epidermis bright, polished, yellow or yellowish green, obsoletely rayed and spotted, and with distant marks of growth; umbonial slope inflated and rounded; posterior slope raised into a carina and furnished with a few obscure lines from the beaks to the margin; anterior cicatrices confluent, large and very slightly impressed; posterior cicatrices confluent, large and scarcely perceptible; dorsal cicatrices small and placed in the centre of the cavity of the beaks; cavity of the shell deep and wide; cavity of the beaks so shallow as to be scarcely perceptible; nacre bluish white and very iridescent.

Soft Parts.—*Branchial uterus* filled through the whole length of the outer branchiæ. *Branchiæ* rather large, rounded below, inner ones rather the larger. *Mantle* very thin, thicker and double at the edges. *Branchial opening* rather small, with numerous

small papillæ on the inner edges. *Anal opening* small, apparently without papillæ. *Super-anal opening* very small, rounded on the edges, far removed from the anal opening and united below. Color of the mass probably whitish, but the long time (15 years?) the specimens have remained in alcohol, has destroyed the color of the papillæ, border, &c.

Embryonic shell light brown, triangular, with hooks, very near in form to *An. Lewisii* (nobis).

Remarks.—A number of specimens of various ages were in the collection of Dr. Berlandier. It is a species very distinct from any which I have seen. It is perhaps nearest to *Dunlapiana* (nobis), but differs in the beaks and in being more square, the dorsal and basal lines being nearly parallel. Some individuals are beautifully green, while others are almost entirely yellow in the epidermis. The beaks are remarkably flat and the undulations of the tips are very small and delicate. It is with great pleasure I dedicate this interesting species to my friend Prof. Joseph Henry, Secretary of the Smithsonian Institution, who is always so liberally disposed to promote a knowledge of the zoology of the country, through the means placed in his hands in the admirable institution over which he presides.

ART. XIV.—*Descriptions of New Species of American Tertiary and Cretaceous Fossils.*

BY WM. M. GABB.

MIOCENE SPECIES.

CANTHARUS, Bolton.

C. CUMBERLANDIANA. Pl. 67, fig. 6. Fusiform; whorls five, prominent; spire not as long as the mouth; outer lip thick, with about eight teeth on its inner margin, inner lip smooth and thin, a large plate of enamel on the columella and a rudimentary tooth on the upper end near the suture; umbilicus distinct but imperforate; canal moderate and slightly curved; surface marked by about ten rounded, prominent, longitudinal ribs, crossed by 18 or 20 revolving lines between some of which exist traces of finer lines, the latter visible only on well preserved specimens. There are also visible the usual lines of growth.

Dimensions.—Length 1 inch, width of body whorl $\frac{11}{20}$ inch, length of mouth .6 inch.

Locality and position.—Miocene marl, near Shiloh, Cumberland Co., N. J.

Collection of the Academy and my collection.

FASCIOLARIA, Lam.

F. WOODII. Pl. 67, fig. 7. Fusiform; whorls four or five, flattened so as to make the sides of the spire nearly straight; outer lip plain; columella with one prominent fold; canal moderate, umbilicus nearly obsolete; surface marked by numerous revolving ribs which exhibit a slight tendency to alternate in size.

Dimensions.—Length 1.3 in., width of body whorl .8, length of aperture .8.

Locality and position.—With the above.

Collection of the Academy.

NATICA, Adanson.

N. HEMICRYPTA. Pl. 67, fig. 5. Globose; whorls four, rounded; spire elevated, suture faint; mouth rounded; callosity small, partly covers the umbilicus, which is deep, surface smooth.

Dimensions.—Length .3 in., width of body whorl $\frac{5}{20}$ inch.

Locality and position.—With the above.

Collection of the Academy and my collection.

MERCENARIA, *Schum.*

M. CANCELLATA. Pl. 67, fig. 25. Convex, beaks inclined anteriorly; umbones prominent and rounded; cardinal margin slightly curved, anterior extremity and basal margin rounded, posterior extremity subangular at its junction, both with the basal and cardinal margin; surface marked by numerous small angular ribs crossed by fine, radiating, impressed lines; anterior muscular impression semi-lunar, posterior larger and irregular; pallial sinus small and angular.

Dimensions.—Length $1\frac{3}{4}$ in., width $2\frac{3}{4}$ in., depth of valve .7 in.

Locality and position.—With the above.

Collection of the Academy. One valve.

OSTREA, *Linn.*

O. MAURICENSIS. Pl. 67, fig. 26. Elongate, subquadrate, narrower at the dorsal than at the ventral or basal end, widest just below the muscular scar, slightly squamose on the surface; muscular scar placed nearly midway between the hinge and basal margin, somewhat crescentic, but widest at its internal end; ligament area wide and undulating.

Dimensions.—Length $1\frac{1}{2}$ inches, greatest width $1\frac{1}{2}$ inches.

Locality and position.—Miocene marl, Maurice River, N. J.

My collection.

I have seen but two lower valves of this species. It was presented to me by my friend Mr. C. C. Abbott.

EOCENE SPECIES.

The following species are all from Texas. Many of them were sent by Mr. Kellogg, from Wheelock, Texas, to the Smithsonian Institution and to the Academy; the rest were given me by my friend Dr. Francis Moore, and are from Caldwell Co., Texas. They are all from a deposit apparently synchronous with that at Claiborne, Ala.; one-third of the species found in the Texan beds, being identical, specifically, with those found in Alabama.

SEPIA, *Arist. Molina* 1782.

✓ S. (BELOSEPIA) UNGULA. Pl. 67, figs. 1, 2, 3, 4.

S. (Belosepia) ungula, Gabb. Proc. Acad. 1860, p. 324.

Shell laterally compressed, especially posteriorly; beak robust, acute, arcuate, and with a very faint ridge on the dorsal surface; ventral plate smaller in proportion than in the other species of this subgenus, slightly undulate and radiate, edge smooth and sharp; dorsal callus straight, deeply rugose, marked on the edge, by about three irregular rugæ and covered on the face and sides with pits or cavities, which extend

on the sides almost to the base of the ventral plate, becoming gradually fainter until they disappear; cavity shallow, ventral edge sharp, interior marked by numerous compound concentric ribs crossed by very faint longitudinal lines.

Dimensions.—Length $1\frac{1}{2}$ inch, length of rostrum $\frac{3}{4}$ in., width of the ventral plate $\frac{3}{4}$ inch, just above the base of the cavity.

The specimen figured is in the Academy's collection, and is somewhat smaller than the above measurements which were taken from a specimen now in the Smithsonian collection.

Locality.—Wheelock, Texas.

This species resembles more nearly *Sepia Cuvieri*, Desh., of the Paris basin than any other, but can readily be distinguished from it by the dorsal callosity, which in our species is not so prominent, and is comparatively sharp, especially towards the extremity nearest the rostrum. The roughening of the surface of the same portion is, in the Paris species, transverse, while in ours it is longitudinal. The ventral plate is one third smaller, in the present species, than in *S. Cuvieri*.

MUREX.

Subgenus ODONTOPOLYS, Gabb.

✓ M. (ODONTOPOLYS) COMPSORHYTIS. Pl. 67, fig. 16. Shell triangular; whorls six; three squamose varices; on the body whorl between the two varices which enclose the aperture are two elongated nodes, on the angle of the whorl, between the next two to the left there are three of these nodes, and in the remaining space there are four, which in this last case extend on the top of the whorl to the suture, and to the anterior extremity of the shell as distinct ribs; these are crossed by a few delicate revolving lines, spire acuminate, canal moderately long and nearly straight; aperture narrow; two plates or folds on the columella, a small rudimentary tooth at the posterior extremity of the mouth, on the inner lip; outer lip thickened and with seven or eight prominent heavy teeth:

Dimensions.—Length .75 in., length of aperture .5 in., width of body whorl .45.

Locality.—Wheelock, Texas. Collection of the Smithsonian Institution.

This shell differs so materially from all the other Murices, that I propose to make it the type of a new subgenus, as above. It resembles the subgenus *Pteronotus* in the arrangement of the varices, but the folds on the columella and the crenulations of the outer lip will serve to distinguish it.

FUSUS, Klein.

✓ F. MORTONIOPSIS. Pl. 67, fig. 15. Scalariform; whorls eight, angular and prominent; spire nearly as long as the aperture; aperture elongated angular above,

canal long, straight, narrow; surface marked by about seven or eight prominent longitudinal ribs, crossed on the shoulder of the whorl by three fine revolving lines, and on the rest of the whorl by six or seven larger lines, with occasional finer ones alternating; on the canal, the alternation of one or two fine lines with a larger one appears to be constant.

Dimensions.—Length 1.4 in., width of body whorl .65 in., length of aperture including canal .8.

Locality.—Wheelock and Caldwell Co., Texas. Collections of the Smithsonian Institution and the Academy and my collection.

This species resembles *F. Mortoni*, Lea, but differs in the alternation of finer lines with the larger ones and in being proportionally more slender.

NEPTUNEA, Bolton.

✓ N. ENTEROGRAMMA. Pl. 67, fig. 14. Fusiform, smooth; whorls six, those of the spire rounded or obscurely angulated above the middle; suture deep; outer lip striate internally.

Dimensions.—Length .9 in., width of body whorl .5 in., length of aperture .6 in.

Locality.—Wheelock, Texas. Smithsonian collection.

The striae on the inner side of the outer lip of the only specimen I have seen consist of four prominent lines above the middle, and a few obsolete ones below. There are traces of a few impressed lines on the beak.

TURRIS, Humph.

(PLEUROTOMA, Montf.)

+ T. CRISTATA. Pl. 67, fig. 8.

Pleurotoma cristata, Con., Jour. Acad. 1st ser. vol. i. pl. 11.

Shell scalariform, whorls ten, carinated on the angle; mouth moderately wide, inner lip covered with a thin coat of enamel, outer lip simple; superior sinus wide, rounded, one-twentieth of an inch deep, canal long, straight; surface marked by distinct lines of growth, crossed by numerous very fine revolving striae.

Dimensions.—Length 1.3 in., length of mouth .6 in., width of body whorl .5 in.

+ T. MOOREI. Pl. 67, fig. 9. Shell elongated fusiform, whorls nine or ten, strongly carinate; mouth narrow, long, half the length of the shell, inner lip covered with a very delicate coat of enamel, so thin as to be visible only on a very well preserved specimen, outer lip thin, showing internally the marks of the larger ribs; surface marked by about twenty-five revolving lines, smaller on the shoulder of the whorl (except one large one at the upper edge, below the suture) than elsewhere; in the largest specimens, two or three of the principal ribs are compound, the rest are simple, near the apex; on the upper two of the principal revolving lines are small tubercles which disappear in the succeeding whorls.

Dimensions.—Length 1.1 in., length of mouth .55 in., width of body whorl .3 in.

The fine specimen figured, is in my collection from Caldwell Co., Texas. It is nearly twice as large as any other specimen I have seen, of the same species.

+ *T. KELLOGII*. Pl. 67, fig. 10. Elongated fusiform, whorls eight; mouth narrow, about two-fifths the length of shell, inner lip slightly thickened, outer lip simple, posterior sinus wide, rounded, canal straight; surface marked by six or seven large longitudinal ribs crossed by very numerous fine, revolving striæ; suture deep.

Dimensions.—Length .5 in. length of mouth .2 in. width of body whorls .15 in.

Locality.—Wheelock, Texas.

This species resembles Lea's figure of *P. Lonsdalei* in its markings, but it is smaller and is both proportionally more narrow and has a larger mouth.

+ *T. TEXANA*. Pl. 67, fig. 11. Narrow fusiform, whorls eleven or twelve; mouth narrow, canal short, straight, outer lip simple, inner lip slightly thickened; surface marked by about twenty revolving lines, two small ones on the shoulder of the whorl and the remainder larger and decreasing from the shoulder towards the end of the canal; traces of longitudinal ribs exist obscurely on the first half dozen whorls.

Dimensions.—Length .7 in., length of mouth .3 in., width of body whorl .2 in.

T. RETIFERA. Pl. 67, fig. 12. Thick, fusiform, robust; whorls seven or eight, spire acuminate; mouth narrow, canal short and slightly bent, outer lip thick, simple, inner lip thin; surface coarsely cancellated by the crossing of longitudinal and revolving lines, the latter about fourteen in number, three or four of which are sometimes double.

Dimensions.—Length .28 in., length of mouth .12 in., width of body whorl .11 in.

Locality.—With the above from Wheelock.

Easily distinguished by its coarsely cancellated appearance.

T. NODOCARINATA. Pl. 67, fig. 13. Turritid; whorls seven, strongly carinated below the middle; suture distinct; mouth linear, columella straight; surface marked by a row of beading, directly below the suture, top of the whorl plain, carina marked by another nodose band larger than the first, rest of the whorl marked by about fifteen heavy revolving ribs, growing smaller on the canal and crossed by much smaller longitudinal lines.

Locality —Wheelock, Texas. Collection of the Academy.

EUCHEILODON, *Gabb, n. g.*

I propose to found this genus to receive a beautiful little species of pleurotomoid shell from Wheelock and from Caldwell Co., Texas.

Gen. Char.—Allied to *Pleurotoma*; fusiform or scalariform; spire high; mouth

linear, canal straight, not emarginate anteriorly, posterior sinus shallow and situated a little distance from the suture, outer lip thin on the edge and crenate within, inner lip thin and marked by numerous bead-like teeth, seen only in the adult shell; surface marked like *Pleurotoma*.

Observation.—The most prominent character by far is the peculiar arrangement of the inner lip. The markings are not folds encircling the columella as in the well known genus *Voluta*, and in the following genus, but a row of minute beads which are found only in the adult individual. I have before me numerous immature specimens which show no trace of these beads or papillæ.

+ *E. RETICULATA*. Pl. 67, fig. 18. Subscalariform, whorls eight, apex acuminate, mouth narrow, linear, outer lip thin on the edge, behind thickened and strongly dentate, inner lip beaded or toothed nearly the whole length, canal straight; surface of the first four whorls smooth and polished, of the fifth marked by minute longitudinal ribs, the remainder by revolving lines between which, but not extending over them, are numerous impressed longitudinal lines, giving under the glass a cancellated appearance.

Dimensions.—Length .45 in., length of mouth .22 in., width of body whorl .13 in. Collections of the Academy and Smithsonian Institution and my collection.

SCOBINELLA, *Con.*, 1848.

+ *S. CRASSIPPLICATA*. Pl. 67, fig. 19. Fusiform, robust; spire straight on the sides; mouth about half the length of the shell, canal straight; umbilicus rudimentary; surface marked by revolving ribs, one narrow nodose rib at the top of the whorl, one wider nodose rib sometimes double on the shoulder, and numerous smaller plain ribs crossing the remainder of the whorl and alternating in size; the nodes on the first two ribs, which are somewhat wider than exhibited on the figure, give this shell a strongly cancellated appearance to the naked eye.

Dimensions.—Length .3 in., length of mouth .16 in., width of body whorl .13 in.

+ *S. LAEVIPLICATA*. Pl. 67, fig. 20. Thick, fusiform; whorls eight or nine, carinate; apex acuminate; mouth narrow, canal short, outer lip striate within, corresponding with the external ribs, inner lip thickened, the folds on the columella smaller than in the preceding species; surface marked by twelve or fifteen angular revolving striæ; no traces of longitudinal ribs or nodes, but obsolete lines of growth.

Dimensions.—Length .22 in., length of mouth .08 in., width of body whorl .08 in. Collection of the Smithsonian Institution.

DISTORTIO, *Bolton*.

+ *D. SEPTEMDENTATA*. Pl. 67, fig. 21. Short, robust; whorls eight, spire short, acuminate; mouth patulous, outer lip thin on the edge, thickened behind the edge

and with seven robust teeth internally, inner lip thin, with a few small teeth, canal short, recurved, surface marked by varices and by irregular longitudinal ribs, crossed by numerous thick revolving lines, giving a coarsely reticulated appearance; between the revolving lines are numerous finer striæ.

Dimensions.—Length .9 in., length of mouth .4 in., width of body whorl .5 in.

PHOS, *Montf.*

✓ P. TEXANUS. Pl. 67, fig. 17. Subfusiform, whorls eight, spire high; mouth small, outer lip with seven or eight teeth inside, inner lip with about six; canal very short, recurved; surface marked by numerous revolving ribs crossed by longitudinal ribs and very indistinct longitudinal impressed lines; the ribs are slightly thickened where they cross on the upper part of the whorl so as to present the appearance of small tubercles or nodes. The young shells, having but three or four whorls, are more robust, polished and coarsely reticulated by distant lines.

Dimensions.—Length .5 in., length of mouth .17 in., width of body whorl .22 in.

PSEUDOLIVA, *Swains.*

✓ P. FUSIFORMIS, Con., MSS. Pl. 67, fig. 30. Fusiform, polished; umbilicus closed by the callus; spire conical, whorls four, slightly convex; suture profound; impressed line on the body whorl obsolete; aperture narrow, elliptical. Figure, natural size.

✓ P. LINOSA, Con., MSS. Pl. 67, fig. 31. Subfusiform, spire high, whorls six; umbilicus open; suture profound; impressed line on the body whorl deep, rest of the whorl marked by numerous revolving ribs, first two or three whorls strongly undulate, aperture elliptical.

Dimensions.—Length .45 in., width of body whorl .3 in., length of mouth .3 in.

✓ P. CARINATA, Con., MSS. Pl. 67, fig. 32. Subovate; entire above the canal or impressed line; whorls five, rounded; suture channelled; aperture elliptical; umbilicus large and profoundly carinated within. Figure, natural size.

✓ P. PERSPECTIVA, Con., MSS. Pl. 67, fig. 29.

Gastrium vestutum, Con., Wailes' Report, Miss. p. 289, pl. 17, f. 4.

Short, ovate, ventricose, spire very short, suture channelled; five revolving lines above the channel, below, seven or eight impressed revolving lines; columella callous; umbilicus large, polished within, and with a submarginal acute carina; umbilical margin carinated; labrum margin waved or dentate below the tooth at the termination of the canal.

"This is a very distinct species."—T. A. C.

AGARONIA, *Gray.* (*Hiatula*, Swains).

✓ A. PUNCTULIFERA. Pl. 67, fig. 22. Fusiform, robust, whorls four, spire short;

mouth nearly straight, wide; anterior sinus wide and moderately deep, posterior sinus narrow and deep; outer lip plain, nearly straight, inner lip with five or six very oblique folds. Surface marked by numerous longitudinal and revolving lines, so arranged as to leave between them a series of minute punctations; suture very distinct; a short distance below the suture there is a prominent revolving rib or carina of twice the size of the other ribs.

Dimensions.—Length .35 in., length of mouth .23 in., width of body whorl .14 in.

Locality.—Wheelock, Texas. Collection of Smithsonian Institution. Very rare.

I have seen one specimen from Claiborne, Ala., in the cabinet of Mr. Lea.

FASCIOLARIA, *Lam.*

✓ F. MOOREI. Pl. 67, fig. 27. Fusiform; whorls eight, spire acuminate; mouth half the length of the shell, outer lip crenate within, inner lip with one tooth at the upper part, columella nearly straight, with three or four nearly transverse folds, the anterior of which is somewhat tuberculous; surface marked by large nodes, seven on the body whorl, crossed by numerous, alternating, revolving lines; suture well marked but shallow.

Dimensions.—Length 1.5 in., length of mouth .75 in., width of body whorl .65 in.

This may possibly be identical with *F. plicata*, Lea, but it differs from his figure in being higher, more slender and in having a straighter canal.

This species appears to be common both at Wheelock and in Caldwell Co., Texas, but the specimens in my collection from the latter locality are of a larger average size than those from Wheelock, some of them being twice as large as any I have seen from the other locality.

✓ F. POLITA. Pl. 67, fig. 28. Fusiform, whorls ten, rounded, spire elevated; aperture narrow, columella short, straight, outer lip simple, crenate within, columella with three large folds and one small one, the latter the most anterior; surface smooth, with several oblique impressed lines on the lower part of the body whorl.

Dimensions.—Length .6 in., length of mouth .27 in., width of body whorl .18 in.

Resembles *F. elevata*, Lea, but has a longer canal and differs in the width of the mouth, the size of the folds and in the absence of all traces of teeth inside the outer lip.

Locality.—Caldwell Co., Texas. My collection.

CYMBIOLA, *Swains.*

C. TEXANA. Pl. 67, fig. 33. Fusiform, whorls five, rounded and somewhat truncated at the upper parts, suture very distinct, apex mamillated; mouth? (very much broken, in the only specimen I have seen;) columella straight, inner lip above faintly striate, below with four large oblique folds; surface polished, but showing minute revolving

lines on the upper whorls and near the base of the body whorl, which are crossed by equally delicate longitudinal lines, giving the first three whorls a finely cancellated appearance.

Dimensions.—Length about 1 in., width of body whorl .4 in.

Locality.—Wheelock, Texas. Collection of the Smithsonian Institution.

MITRA, Lam.

M. MOOREANA. Pl. 67, fig. 24. Shell subfusiform, whorls eight, apex mamillated, suture distinct; mouth about half the length of the shell, outer lip sharp, plain, inner lip heavy, four large folds on the columella; surface marked by short spinous nodes on the angle of the whorls (about eight on the body whorl), and by numerous fine revolving lines, crossed by prominent lines of growth.

Dimensions.—Length 1.05 in., length of mouth .6 in., width of body whorl, including spines, .5 in.

Locality.—Wheelock and Caldwell County, Texas. The figure was accidentally reversed.

M. EXILE. Pl. 67, fig. 23. Shell subfusiform, whorls eight, the first three smooth and polished, the remainder truncated above; suture deep; mouth small, linear, outer lip simple, four folds on the columella; surface, except the first three whorls, marked on the upper edge, immediately below the suture, by a broad, slightly undulating band, and by prominent longitudinal ribs, which form almost continuous lines from the top of the fourth whorl to near the base of the body whorl, body whorl marked at the base by a few transverse lines, continuation of the folds on the columella.

Dimensions.—Length .25 in., length of mouth .09 in., width of body whorl .08 in. Common.

ERATO, Risso.

✓ E. SEMENOIDES. Pl. 67, fig. 49. Ovoid, whorls about three, spire very low; mouth linear, narrow, inner lip with a number of large teeth; outer lip very much inverted so as to resemble in an old specimen a nearly perfect *Cypræa*, finely crenulated inside, anterior emargination deep.

Dimensions.—Length .15 in., greatest width .09 in.

Resembles closely *E. semen*, (*Marginella semen*, Lea,) but can be distinguished by its size, being not as large by one-third.

Locality.—Caldwell Co., and Wheelock, Texas.

This species has never been found at Clairborne, nor has *E. semen* yet been seen from the Texan strata.

NEVERITA, *Risso*.

N. ARATA. Pl. 67, fig. 35. Subglobose, oblique, approaching Sigaretus in the angle of the body whorl; whorls five, very much enveloped, spire low, suture indistinct; mouth ovate, outer lip very thin, inner lip thick, with a slight emargination between the inner and outer lip at the posterior angle; umbilicus large, nearly filled by the callosity on which exists sometimes two, sometimes three deep, transverse grooves, surface smooth, polished.

Common from both localities.

Dimensions.—Height .18 in., greatest diameter of mouth .25 in., width of body whorl .31 in.

LUNATIA.

L. MOOREI. Pl. 67, fig. 34. Thin, subglobose; whorls three, flattened above, spire low; mouth ovate, outer lip plain, arcuate, inner lip and columella very thin; umbilicus closed, callus very small, almost rudimentary; surface smooth.

Dimensions.—Height .15 in., length of mouth .12 in., width of body whorl .13 in.

Locality.—Caldwell County. My collection. Rare.

MONOPTYGMA, *Lea*.

— M. CRASSIPICA, Con., MSS. Pl. 67, fig. 37. Fusiform, moderately thick, aperture rather narrow; fold on the columella thick and elevated.

Dimensions.—Length 1 in., width of body whorl .5 in., length of mouth .55 in.

Locality.—Wheelock, Texas.

“It is interesting to find a second species of this genus with a more prominent fold than the typical shell. It confirms the propriety of separating the species from those of *Ancilla*, and the genus *Monoptygma* may now be regarded as of Eocene origin and probably does not occur in the upper tertiaries.”—*Conrad*, MSS.

ARCHITECTONICA, *Bolton*, 1698. *Solarium*, *Lam.*, 1799.

A. TEXANA. Pl. 67, fig. 38. Subconical, whorls five or six, smooth, spire low; mouth rhomboidal; umbilicus wide and bordered on the edge by a single row of tubercles; body whorl has a sharp carina on the margin; surface above smooth; suture almost obliterated, surface below, and in the umbilicus, striate across the whorl.

Dimensions.—Height .3 in., diameter of disc .6 in.

— A. VESPERTINA. Pl. 67, fig. 39. Subconical; whorls four, carinated; spire low; mouth rhomboidal, umbilicus wide; suture linear and faintly undulating; surface above marked by numerous very obscure revolving lines, which show a slight tendency to carry tubercles; these are only visible under a glass; edge of body whorl bounded by

a rounded carina; under surface much more distinctly striate than the upper; on the edge of the umbilicus, and on the middle of the inner side of the whorl in the umbilicus, there is a row of tubercles, and between the two rows are small revolving lines.

Dimensions.—Height .2 in., diameter of disc .55 in.

Locality.—Caldwell Co., Texas. My collection.

✓ *A. MEEKANA*. Pl. 67, fig. 40. Discoid, whorls five, strongly carinate on the edge and somewhat rounded below; mouth subrhomboidal; umbilicus wide; surface above marked on the edge and on the middle of the whorl by two large, revolving nodose lines, and on the rest of the top by five smaller ones; between the two large ones there are numerous cross lines passing from one to the other; below, besides the "keel" on the edge of the whorl, there are seven ribs, one large one bordering the umbilicus and six smaller alternating ribs; in the umbilicus there is one rib on the middle of the whorl, besides the one on the edge.

Dimensions.—Height .1 in., diameter of disc .32 in. width of umbilicus .15 in.

This beautiful species, under a glass, looks as if covered with "beading," all the ribs having that peculiar structure. Four specimens from Caldwell Co., in my collection. One very fine one from Wheelock, in the collection of the Smithsonian Institution.

SPIROBIS, *Swains.*

✓ *S. LEPTOSTOMA*. Pl. 67, fig. 41. Discoid; whorls three, carinated and partly enveloping the preceding whorl; mouth contracted, circular and advanced at a tangent from the subjacent whorl; surface marked by irregular undulating transverse striæ.

Dimensions.—Diameter .3 in.

Locality.—Common from Wheelock, and found in Caldwell Co.

TURRITELLA, *Lam.*

✓ *T. NASUTA*. Pl. 67, fig. 42. Shell elongated, slender; whorls many (number? eleven in one inch); mouth small, suture distinct; surface marked by eight revolving lines, two or three of which are larger than the rest.

Dimensions of a specimen one inch long.—Width of body whorl .2 in., length of mouth .15 in.

All the specimens I have seen are broken and nearly all worn smooth. It is common.

Locality.—Caldwell Co., Texas, and Wheelock.

EULIMA, *Risso.*

✓ *E. EXILIS*. Pl. 67, fig. 43. Elongated, slender, polished; whorls eight; apex acuminate, mouth small, outer lip nearly straight.

Dimensions.—Length .23 in., width of body whorl .05 in., length of mouth .05 in.

Locality.—Caldwell Co. My collection with the next two species. Rare.

E. TEXANA. Pl. 67, fig. 44. Elongated, more robust than the preceding; whorls eight, slightly rounded, narrow; surface polished; suture distinct.

Dimensions.—Length .12 in., width of body whorl .03 in., length of mouth .02 in.

E. TENUA. Pl. 67, fig. 45. Very elongated and narrow; whorls nine, rounded; suture distinct; mouth very small; oval.

Dimensions.—Length .15 in., width of body whorl .025 in., length of mouth .02 in.

DENTALIUM, Lam.

D. MINUTISTRIATUM. Pl. 67, fig. 46. Very slightly curved, marked by numerous small longitudinal ribs, all of the same size, no trace of alternation; aperture round.

Dimensions.—Length 1 in., width of aperture .08 in.

Locality.—Common at Wheelock.

DITRUPA.

D. SUBCOARCUATA. Pl. 67, fig. 47. Arcuate, widened in advance of the middle; aperture contracted, circular; surface polished.

Dimensions.—Length .33 in., greatest diameter .07 in., diameter of aperture .035 in.

Locality.—Common at Wheelock.

BULLA, Klein.

B. KELLOGH. Pl. 67, fig. 50. Subcylindrical; spire hidden; mouth linear, outer lip straight; umbilicus rudimentary, surface smooth.

Dimensions.—Length .14 in., width .07 in.

Rare, but I have seen it both from Wheelock and Caldwell Co.

VOLVULA, A. Adams.

V. CONRADIANA. Pl. 67, fig. 51. Subcylindrical, narrow; apex of body whorl about as high as the width of the lower part of the mouth; mouth linear, extending the whole length of the shell and slightly wider anteriorly than elsewhere, outer lip nearly straight; inner lip slightly thickened at the anterior extremity; surface marked by microscopic impressed revolving lines.

Dimensions.—Length .17 in., width .06 in.

Locality.—Rare from both localities.

V. MINUTISSIMA. Pl. 67, fig. 52. Subglobose; mouth arcuate, subtruncate anteriorly; substance of shell moderately thick; surface minutely granular; a distinct fold is formed by the inner lip anteriorly and bounds the mouth in that direction.

Dimensions.—Length .09 in., width .05 in.

Locality.—More common than the preceding, from Caldwell Co. : My collection.

HELCION, *Montfort*.

✓ H. LEANUS. Pl. 67, fig. 48. Subcircular, apex sub-marginal, inclined anteriorly; surface marked by numerous, irregular, radiating ribs, crossed by undulating lines of growth. Rare.

Dimensions.—Diameter .06 in., height .03 in.

CORBULA, *Brug*.

✓ C. TEXANA. Pl. 67, fig. 54. Inflated, subtriangular, thick, umbones large; right valve marked by numerous large, transverse ribs; umbonal slope rather abrupt; basal margin regularly rounded; left valve?

Dimensions.—Length .3 in., width .38 in., depth of right valve .15 in.

Common. I have seen numerous specimens of the right valve, but no left valves.

TELLINA, *Brug*.

? T. MOOREANA. Pl. 67, fig. 56. Wide, flattened, nearly equilateral; beaks small, inclined internally; hinge line in advance of the beaks, straight, posterior slightly curved; surface smooth, or covered only by obsolete lines of growth.

Dimensions.—Length .5 in., width .9 in., thickness .2 in.

Locality.—Caldwell Co. One specimen, in my collection.

CIBOTA, *Brown*. (*Byssoarca*, Swains.)

✓ C. MISSISSIPPIENSIS. Pl. 67, fig. 58.

Byssoarca Mississippiensis, Con., Jour. Acad. Nat. Sci., 1st series, Vol. 1, pl. 13.

Inequilateral, equivalve; beaks small, incurved, situated in advance of the middle; basal margin, below and in advance of the beaks, deeply emarginate; surface marked by numerous dichotomous radiating folds, crossed by imbricating lines, presenting a reticulated or granulated appearance; area very narrow; hinge narrow, almost linear in the middle, anteriorly and posteriorly, the crenulations are oblique, sometimes angulated.

Dimensions.—Length .7 in., width 1.6 in.

Common.

LEDA, *Schum*.

✓ L. COMPSA. Pl. 67, fig. 57. Inequilateral; beaks very small, incurved; shell rounded anteriorly, acuminate posteriorly; basal margin very regularly curved; hinge teeth very small, fosset triangular; surface marked by numerous transverse ribs,

smaller in the middle than elsewhere, doubling in thickness and changing their direction on the umbonal ridge, and continuing somewhat larger posterior to the ridge than in advance of it; there is a furrow immediately posterior to the ridge, about equal in size to the ridge itself.

Dimensions.—Length .45 in., width 1.3 in., height of valve .1 in.

Locality.—Caldwell Co., Texas. My collection.

NCETIA, *Gray*.

N. PULCHRA. Pl. 67, fig. 55. Subquadrangular; beaks small, incurved; umbonal slope nearly straight; anterior margin rounded, basal arcuate, posterior subangular; surface marked by numerous radiating and transverse lines; edge crenate within; posterior muscular scar subtriangular, anterior subrhomboidal.

Dimensions.—Length .27 in., width .35 in.

CRASSATELLA, *Lam.*

C. ANTESTRIATA. Pl. 67, fig. 53. Subquadrate; beaks very small; umbonal slope wide, umbonal ridge rounded; anterior margin semicircular, basal regularly arcuate, posterior subbiangular; surface marked by numerous, large, transverse folds, which commence at the anterior margin, but disappear before reaching the middle of the shell, leaving the rest almost perfectly smooth, (this is not the result of attrition); interior margin very delicately crenate, anterior muscular impression semilunar, posterior subquadrate.

Dimensions.—Length .5 in., width .6 in.

ANOMIA, *Linn.*

A. EPHIPPIOIDES. Pl. 67, fig. 59. Very irregularly subquadrate, sometimes nearly circular, sometimes almost triangular; convex, occasionally marked by longitudinal rugæ, and always by distinct lines of growth; lower valve, the muscular foramen large; ligament margin thickened.

Size of largest specimen.—Length 1.5 in., width 1.3 in.

Common.

SERPULA, *Linn.*

S. TEXANA. Pl. 67, fig. 41. Triangular, surmounted by a longitudinal ridge, transversely rugose; aperture subquadrangular. On shells.

Dimensions.—Diameter .01 in. to .02 inch.

FLABELLUM.

F. PACHYPHYLLUM, *Gabb and Horn*. Pl. 69, figs. 1, 2, 3. Flat, wedge-shaped, edges forming an acute angle; edge coarsely toothed; sides longitudinally striate,

crossed by several transverse ridges; laminae thick, edges dentate, sides of laminae granulous, granules without any marked arrangement.

Dimensions.—Height .8 in., breadth .8 in., thickness .5 in.

Locality.—Caldwell Co., Texas. My collection. I have seen no specimens of this, or the following species, from Wheelock.

TROCHOSMILIA MORTONI, *G. and H.* Pl. 69, figs. 4, 6. Straight or somewhat curved near the apex, exteriorly striate; striae denticulate, sometimes connected by the junction of opposite teeth; laminae crowded, thin.

Dimensions.—Length 1 in., breadth 1.1 in., thickness .7 in.

CYLICOSMILIA, *M. Edw.*

C. CAULIFERA, *G. and H.* Pl. 69, figs. 7–9.

Turbinolia caulifera? Con., Jour. Acad., 2d series, Vol. 1, pl. 13, figs. 33 and 34.

Conical, slightly flattened, with the laminae coarsely granulous; columella large, occupying one-third of the calice, exteriorly striate; striae with their edges acute, often dichotomous, connected by short, transverse bands.

Dimensions.—Length .75 in., width .4 in., thickness .35 in.

Locality.—Caldwell Co., Texas. My collection.

This species differs slightly from the generic description, in having ribs which are dichotomous, but as the genus was described from a single species, and as the present species differs in no other respect, it is fair to infer their generic identity, and to conclude that the absence of ramifications is not a generic character.

This species is probably identical with *Turbinolia caulifera* of Conrad, described from Vicksburg, Miss. Should it prove distinct we would suggest the specific name *C. dichotoma*. Conrad's species is, according to the figure, a true *Cylicosmilium*.

CRETACEOUS SPECIES.

FUSUS, *Klein.*

F. HOLMESIANUS. Pl. 68, fig. 4. Fusiform, whorls eight, angulated; spire acuminate, elevated, not as long as the mouth; surface marked by a series of elongated nodes on the angles of the whorls, (fourteen on the body whorl,) crossed by very fine revolving lines; mouth long, canal long and nearly straight.

Dimensions.—Length .9 in., width of body whorl .45 in., length of mouth .6 in.

Locality.—Ripley Group, Eufala, Ala. Collection of Prof. Holmes.

NEPTUNEA, *Bolton.*

N. IMPRESSA. Pl. 68, fig. 5. Fusiform, whorls six, rounded; spire sharp, but not

very high; mouth ovate, canal moderately long, outer lip simple, inner lip coated with a somewhat heavy layer of enamel, a very small sinus between the two lips posteriorly, not an emargination but rather a continuation of the suture, lined with enamel; surface in some specimens nearly smooth, in others closely marked by fine impressed, revolving lines.

Dimensions.—Length .8 in., width of body whorl .5 in., length of mouth .55 in.

Locality.—Hardeman Co., Tenn. Ripley Group.

This species, with all the following, which are from Tennessee, were kindly loaned me by my friend, Prof. Safford, of the Geological Survey of that State, who informs me that he found the peculiar marls of the "Ripley Group" alternating in his State, with a limestone, which from the lithological character of the fossils from it, I should think to be identical with the limestone of Prairie Bluff, Ala.

FASCIOLARIA, *Lam.*

F. SAFFORDI. Pl. 68, fig. 6. Fusiform, spire? (broken in all the specimens); suture distinct; mouth linear, columella slightly recurved and with three small oblique folds, inner lip slightly thickened at the upper part; surface marked by longitudinal ribs, (about eleven on the body whorl,) crossed by numerous revolving lines.

Dimensions.—Length of the body whorl of the smallest, but most perfect specimen, .6 in., width of ditto .4 in., length of mouth .55 in.

Locality.—With the above. Prof. Safford.

ROSTELLARIA, *Lam.*

R. ROSTRATA. Pl. 68, fig. 7. Fusiform, outer lip very much produced laterally; whorls six; canal moderately long; surface marked by nodes on the angle of the whorl, which are prolonged below into ribs extending over a large portion of the whorl; other markings? Casts.

Dimensions.—Length about 1 in., width of body whorl, including lip, .7 in.

Locality.—Burlington Co., N. J., and Prairie Bluff, Ala.

These specimens have been in the Museum of the Academy for a number of years, marked with the above name by Dr. Morton, and with his name attached; they have not, however, been heretofore described.

CANCELLARIA, *Lam.*

C. EUFALENSIS. Pl. 68, fig. 8. Subfusiform, spire elevated; whorls five, rounded; mouth subquadrate; surface marked by numerous, large, revolving ribs, between which are smaller ones, and crossed by longitudinal ribs of about the same size as the

former; where the two sets of large ones cross they are slightly enlarged; umbilicus apparently obsolete, (specimen somewhat broken at that spot.)

Dimensions.—Length .5 in., width of body whorl .4 in., length of mouth .2 in.

Locality.—Ripley Group, Eufala, Ala. Prof. Holmes.

CYPRÆA, Linn.

C. MORTONI. Pl. 68, fig. 8. Ovate; (casts) spire enveloped; mouth finely crenate on both sides; shell widest about the middle; no marking on the cast.

Dimensions.—Length .65 in., width .45 in., height .4 in. from mouth to back.

Locality.—Prairie Bluff, Ala., and blue marl, Burlington Co., N. J.

CHEMNITZIA, D'Orb.

C. OCCIDENTALE. Pl. 68, fig. 10. Turritid; whorls nine or ten; suture deep; mouth subquadrate; surface marked by a nodose carina around the upper part of the whorls; other markings?

Dimensions.—Length 4.5 in., width of body whorl 2 in., greatest diameter of mouth 1.5 in.

Locality.—Indian Territory, near the Choctaw Mission, from a deposit containing *Globiconcha elevata*, Shumard, *Ammonites Vespertinus*, Morton, and *Gryphæa Pitcheri*, Morton.

I was enabled to procure this species through the kindness of my friend, Dr. Janeway. There is a *Turritella* in the collection with the above species, allied to, and probably identical with, *T. planilateralis*, Conrad. It exhibits a slight difference in the arrangement of the ribs, but I shall hesitate to consider this of specific importance. Further research may prove them to be different. Although the specimen above described still retains the shell, it is so much weathered as to have obliterated any fine markings which may have existed.

LUNATIA.

L. HALLI. Pl. 68, fig. 11. Elongated, subglobose, spire high; whorls five, rounded and angulated above; mouth elliptical, umbilicus open; surface smooth or minutely wrinkled.

Locality.—Common in the ferruginous and the black marl of New Jersey. It is very rare, however, to find the shell preserved. Of fourteen specimens in my collection, only two show any remains of shell, and but one exhibits the surface markings.

This species approaches *N. paludineæformis*, H. and M., but can be readily distinguished by the great difference in size, by the angulation of the whorls, the markings and the open umbilicus.

TURRITELLA, *Lam.*

T. SAFFORDI. Pl. 68, fig. 11. Scalariform; whorls eight or ten, somewhat carinated below, flattened on the side; suture profound; mouth subquadrate; surface marked by three small revolving lines on the lower portion of the whorl, near the suture, and on some specimens by obscure revolving lines near the whole whorl, always crossed by waved lines of growth.

Dimensions.—Length (restored) 2.2 in., width of body whorl .6 in., length of mouth .4 in.

Locality.—Hardeman Co., Tenn. Prof. Safford. From the light grey limestone alternating with marls of the Ripley Group.

T. TENNESSEENSIS. Pl. 68, fig. 13. Turritid, spire high; whorls? (10?) flattened or concave on the side, carinated strongly below; mouth subquadrate; surface marked by numerous revolving striae, two or three of which are generally larger than the rest, the remainder usually alternating, one or two small ones with one slightly larger.

Dimensions.—Length (restored)? 1.2 in.? width of body whorl, one inch from apex, .35 in.

Locality.—Hardeman Co., Tenn., marls of Ripley Group. Prof. Safford.

T. PUMILA. Pl. 68, fig. 14. Turritid, whorls? (spire is broken) rounded and strongly striate; mouth round; shell very thick; surface marked by three heavy revolving lines on the convexity of the whorl, and one at the base just above the suture, which is small but distinct.

Dimensions.—Length of fragment .5 in., width of body whorl .3 in., diameter of mouth .1 in.

Locality.—With the above. Prof. Safford.

T. HARDEMANENSIS. Pl. 68, fig. 15. Turritid; whorls seven, strongly carinated at the middle; mouth rounded; surface marked by two or three large ribs below the carina and two above.

Dimensions.—Length .6 in., width of body whorl .27 in., length of mouth .2 in.

Locality.—With the above. Prof. Safford.

I have seen a very young specimen of this species from the *Ripley Group in New Jersey*. It is in the cabinet of Mr. Lea, and was found in a bed with the same lithological characters as the Ripley in the South, and associated with *Leda protecta*, Gabb, *Legumen ellipticus*, Con., *Leda longifrons*, Con., *Pinna laqueata*, Con.; and other species, all of which are characteristic of that group. I believe this to be the first time that this group has been recognized north of Tennessee, and we now have the key to the synchronism of the cretaceous formations east of the Mississippi.

DENTALIUM, *Linn.*

D. RIPLEYANUM. Pl. 68, fig. 17. Very slightly arcuate, moderately thick, surface marked by faint longitudinal ribs especially on the inner side of the curve and by obsolete lines, crossed by circular lines of growth.

Dimensions.—Length of fragment .5 in., greatest external diameter .15 in.

Locality.—Eufala, Alabama. Ripley Group.

PHOLAS, *Linn.*

P. CRETACEA. Pl. 68, fig. 18. Tube conical, rounded at the widest end, surface marked by oblique lines; shell?

Dimensions.—Length of tube 1 in., diameter (greatest) .35 in.

Locality.—Raritan Bay, N. J., in wood, and replaced by pyrites.

Collection of the Academy.

TEREDO, *Linn.*

T. IRREGULARIS. Pl. 68, fig. 19. Tube irregular, tortuous, dilated in places and sometimes transversely wrinkled.

Shell twice as large as that of *T. tibialis*, more abruptly truncate anteriorly. I have been able to see but a small portion of the shell of this species. It is imbedded in the portion of the tube figured. Collection of the Academy.

GASTROCHAENA, *Spengl.*

G. AMERICANA. Pl. 68, fig. 20. Elongated conical; transversely wrinkled; termination of widest end, round.

Dimensions.—Length 2.5 in., greatest diameter .5 in.

Locality.—Common in the yellow limestone of Timber Creek, and found with the above species in the brown marl of Burlington Co., N. J.

ISOCARDIA, *Lam.*

I. CONRADI. Pl. 68, fig. 21. Triangular, equivalve; beaks large, inclined anteriorly; umbones large; anterior margin nearly straight, basal sinuate, posterior subangular below, nearly straight above; surface marked by fine concentric lines.

Dimensions.—Length 1.1 in., width 1.4 in., diameter 1 in.

Locality.—Prairie Bluff, Ala., and Timber Creek, N. J. Casts.

VENUS, *Linn.*

V. RIPLEYANA. Pl. 68, fig. 22. Inequilateral; beaks small, anterior; cardinal

margin strongly curved, anterior semicircular, basal and posterior regularly rounded, surface marked by regular transverse ribs.

Dimensions.—Length .55 in., width .7 in., diameter .38 in.

Locality.—Ripley Group, Hardeman Co., Tenn. Prof. Safford.

This species may be distinguished from *Dione Delawareensis*, Gabb, in its external appearance, by being shorter proportionally, and more pointed posteriorly. The surface markings are different, those of the latter species being finer and not so regular.

V. MEEKANA. Pl. 68, fig. 23. Subtriangular, beaks small, curved strongly anteriorly; umbones small; lunule bordered by an impressed line; cardinal margin curved.

Dimensions.—Length .35 in., width .5 in., height of valve .1 in.

Locality.—Ripley Group, Eufala, Alabama. Collection of the Smithsonian Institution, No. 551.

CORBULA, Brug.

C. SUBCOMPRESSA. Pl. 68, fig. 24. Subquadrate, beaks nearly central; umbones large, umbonal ridge angular, umbonal slope abrupt, anterior margin regularly rounded, posterior slightly sinuous, posterior subbiangular; hinge very small.

Dimensions.—Length .14 in., width .22 in.

Locality.—Two miles east of Middleton, Hardeman Co., Tenn.

This species resembles closely *C. compressa*, Lea, from the Eocene of Ala., although it is undoubtedly distinct.

C. CRASSIPICA. Pl. 68, fig. 25. Subtriangular, heavily ribbed, thick; beaks large and incurved; umbones large and round; umbonal ridge small and marked by a distinct groove immediately in advance of it, rest of the shell marked by about a dozen very coarse transverse ribs except on the umbones which are smooth apparently from attrition. Inside hinge large, caudal prolongation marked by two pit-like depressions.

Dimensions.—Length .15 in., width .2 in., height of right valve .07 in.

Locality.—From a cut on the Memphis and Charleston R. R., where it crosses the Tennessee and Mississippi State line, with *Astarte crenulirata*, Con. Prof. Safford.

C. EUFALENSIS, Pl. 68, fig. 26. Subtriangular; angles, except posterior, rounded; beaks small, pointed anteriorly; left valve very convex; margin strongly incurved, almost at a right angle; anterior margin above straight, below abruptly rounded; basal margin very slightly sinuate; posterior margin angular at its junction with the basal, incurved above; hinge large; right valve?

Dimensions.—Length .4 in., width about .7 in., height of left valve .2 in.

Locality.—Ripley Group, Eufala, Ala. Collection of Smithsonian Institution, No. 560.

ASTARTE, Sow.

A. OCTOLIRATA. Pl. 68, fig. 27. Subquadrate, flattened; beaks small and very

anterior; cardinal margin curved, anterior slightly sinuate, basal and posterior regularly rounded; surface marked by about eight large transverse ribs and numerous smaller ones; lunule small, deep.

Dimensions.—Length .15 in., width .2 in., height of valve .03 in.

Locality.—Ripley Group, Eufala, Ala. My collection.

CRASSATELLA, *Lam.*

C. PTEROPSIS. Pl. 68, fig. 28. Subtriangular, flattened; beaks very small; in some specimens a slight depression in advance of the umbonal ridge, which is rounded; surface marked by heavy transverse ribs, which become faint on and behind the umbonal ridge; hinge rather small; muscular scars deeply impressed; cardinal margin straight, anterior margin regularly rounded, basal margin slightly sinuous, posterior subangular.

Dimensions.—Length .9 in., width 1.4 in., height of valve .2 in.

Locality.—Ripley Group, Hardeman Co., Tenn., Prof. Safford; and from the same formation at Eufala, Ala. Collection of the Smithsonian Institution, No. 553.

CARDITA, *Brug.*

C. SUBQUADRATA? *Gabb.* Prof. Safford sent me, with the other species, several fragments of specimens, which must have been at least two inches in diameter. They are of the same outline, and, as far as I can ascertain, have the same markings as the above species. In the larger specimens the intermediate radiating ribs die out, leaving the ribs of nearly the same shape as *C. planicosta* of the Eocene formation.

Locality.—They are from Hardeman Co., Tenn.

CARDIUM, *Linn.*

C. MULTIRADIATUM. Pl. 68, fig. 29. Subquadrate, equilateral; beaks small; surface marked by numerous, fine, radiating ribs of equal size.

Dimensions.—Length 1 in., width .9 in.

Locality.—Ripley Group, Eufala, Ala. Collection of the Smithsonian Institution, No. 509.

This is most probably identical with a cast found abundantly in the brown marl of New Jersey.

MODIOLA, *Lam.*

M. SAFFORDI. Pl. 68, fig. 30. Gibbous, widened posteriorly; beaks small, anterior; umbones very large; umbonal ridge prominent, rounded, with a rounded furrow anterior to it; cardinal margin nearly straight, posterior margin rounded, anterior wide and regularly rounded, basal sinuous; surface marked by regular radiating ribs,

except a small space between the umbonal ridge and the beak, leaving a little more than one-third of the basal portion plain, or only marked by lines of growth.

Dimensions.—Length .3 in., width .6 in., greatest height of valve .2 in.

Locality.—From the marls and alternating limestone of the Ripley Group, Harde-man Co., Tenn.

M. OVATA. Pl. 68, fig. 31. Shell wide; beaks anterior; cardinal line nearly straight, posteriorly rounded, basal slightly sinuate; surface marked by obscure, concentric lines of growth.

Dimensions.—Greatest length .8 in., width 1.5 in., diameter .6 in.

Locality.—Yellow Limestone, Timber Creek, N. J. Collection of the Academy.

TRIGONIA, Brug.

T. EUFALENSIS. Pl. 68, fig. 32. Subtriangular, resembles *T. alæformis*, Sow., in outline, not quite so elongate anteriorly; beaks posterior; lunule distinct; surface marked by about fourteen ribs, the more anterior of which proceed from the lunule anteriorly and then cross the shell at right angles with the lunule, exhibiting a tendency to being nodose, especially near the lunule; lunule marked by ten or twelve transverse ribs; cardinal margin somewhat incurved, anterior elongate and subbi-angular, basal sinuous and deeply serrate, posterior regularly rounded; internally, hinge teeth small, muscular impressions deep; pallial line entire; a small tooth-like ridge or process extends along the middle of the alation, as in *T. alæformis*.

Dimensions.—The figure is of the natural size.

Locality.—This is a very distinct species, and I have never seen a specimen larger than the one figured. It is common at Eufala, Ala. Collection of the Academy.

AXINÆA, Poli. (*Pectunculus*, Lam.)

A. ROTUNDATA. Pl. 68, fig. 33. Subcircular, somewhat convex; beaks small and central; surface marked by radiating, impressed and transverse lines; area narrow; hinge crenations large, lateral teeth straight and placed obliquely; muscular impressions subquadrate, but slightly differing in outline; margin distinctly crenate.

Dimensions.—Length .8 in., width .9 in., height of valve 3 in.

Locality.—Eufala, Ala., Ripley Group. Prof. Holmes.

I have an imperfect specimen before me nearly two inches across.

NUCULA, Lam.

N. DISTORTA. Pl. 68, fig. 34. Triangular, very inequilateral; beaks anterior, marginal; lunule large, cardinal margin nearly straight, posterior subangular, basal regularly rounded, anterior nearly straight; surface marked by obsolete radiating and transverse lines.

Dimensions.—Length .23 in., width .3 in., depth of valve .1 in.

Locality.—Ripley Group, with *Corbula crassiplica* and *Astarte crenulirata* on the Mississippi and Tennessee State line. Prof. Safford.

N. EUFALENSIS. Pl. 68, fig. 35. Equilateral; beaks small; surface marked by numerous, concentric lines.

Dimensions.—Length .35 in., width .55 in., height of valve .1 in.

Locality.—Common in the Ripley Group at Eufala, Ala. My collection.

LEDA, *Schum.*

L. PROTEXTA. Pl. 68, fig. 35.

L. protexta, Gabb, Jour. Acad. Nat. Sci., 2d series, Vol. 4, p. 303, pl. 48, fig. 23. (24 in text per errorem.)

This species was originally described from a cast from New Jersey. Through the kindness of Prof. Safford I am now enabled to describe it more fully.

Spec. Char.—Very wide transversely; beaks small, incurved; posterior end acuminate, curved slightly upwards; anterior and basal margins regularly rounded; surface marked by numerous, transverse ribs.

Dimensions of the most perfect specimen.—Length .5 in., width .25 in., diameter .2 in.

Locality.—Hardeman Co., Tenn. Ripley Group.

One specimen in the lot, received from Prof. S., is as large as the cast originally described, but it is broken.

L. SLACKIANA. Pl. 68, fig. 36. Inequilateral, (casts); muscular scars large and deep; margin crenate; cardinal line apparently curved, basal irregularly rounded; hinge teeth apparently large, cup very distinct, pallial line very distinct.

Dimensions.—Length about .6 in., width about .8 in.

Locality.—Dark marl, Crosswicks, N. J. My collection.

This is one of the finest casts I have ever seen from New Jersey. I take pleasure in dedicating it to my friend, Dr. J. H. Slack, to whom I am indebted for this and several other new species.

ARCA, *Linn.*

A. SAFFORDII. Pl. 68, fig. 37. Gibbous, nearly equilateral; beaks small, overhanging the area; umbones broad; area narrow and transversely striate; anterior margin narrower and straighter than the posterior, which is regularly curved; surface marked by obscure radiating and concentric lines; hinge rather broad, curved; teeth large.

Dimensions.—Length .2 in., width .26 in., height of valve .1 in.

Locality.—Hardeman Co., Tenn. Prof. Safford. Also found in the Ripley Group of New Jersey.

A. (MACRODON) EUFALENSIS. Pl. 68, fig. 38. Inequilateral; beaks large; umbones large and slightly grooved in the middle by a shallow sulcus, which extends nearly to the base of the shell; area very small; hinge line straight, lower edge of the hinge slightly curved; lateral teeth very long; anterior margin curved, basal sinuous, posterior margin curved, upper part inclined anteriorly; surface marked by numerous radiating ribs and smaller transverse lines.

Dimensions.—Length .4 in., width .5 in.

Locality.—Eufala, Ala. Ripley Group. My collection.

There is a specimen (No. 516) in the collection of the Smithsonian Institution, apparently of this species, 1.8 in. wide.

. OSTREA, *Linn.*

O. CRENULIMARGINATA. Pl. 68, fig. 40, 41. Subtriangular, sometimes elongated oval; attached; portion of the outside of the shell not attached is very squamose; hinge about an equilateral triangle, central groove of the hinge deep; internal margin strongly crenate, muscular impression large; upper valve?

Dimensions.—Length 2.2 in., greatest width about 2 in.

Locality.—Found in a marl bank, two miles east of Middleton, Tenn. Rather common and associated with *O. denticulifera*, Con.

DISCOIDEA, *Klein.*

D. OCCIDENTALE. Pl. 68, fig. 42, 43, 44. Circular, ambulacres narrow about four ambulacral plates to one interambulacral; interambulacral plates narrow, numerous; anus? obliterated by weathering; mouth small, central; under surface marked by numerous small tubercles, placed irregularly; upper surface, if any existed they have been obliterated.

Locality.—Cretaceous, Oregon. My collection.

SERPULA, *Linn.*

S. HABROGRAMMA. Pl. 68, fig. 16. Rounded above, attached by a flat base; surface smooth or obscurely wrinkled transversely, and sometimes with two or three longitudinal lines; aperture round.

Dimensions.—Width of aperture .06 in., length of tube 1.5 in.

Locality.—On the upper valve of *Gryphaea vesicularis*, from the Yellow Limestone, Long Branch, N. J. Collection of the Academy.

HAMULUS, *Morton.*

H. SQUAMOSUS, *Gabb.* Pl. 58, fig. 45.

Cat. Cret. p. 1, Proc. Acad. Nat. Sci. 1859.

H. onyx, Morton, (pars) Synopsis Cret. p. 73.

Elongated, curved at the narrow end into a hook sometimes with as much as three fourths of a whorl, all in the same plane; mouth slightly constricted, nearly circular, edge thin; surface marked by two or three wrinkled longitudinal folds on each side and a heavy squamose plate, very irregular in the plane of the curve on each side.

Dimensions.—Length about 1 in., exclusive of the curve, greatest width of the plates .4 in., diameter of mouth .12 in.

H. MAJOR, n. s. Pl. 68, fig. 46. Large, regularly curved, tapering, marked by three or four large longitudinal corrugations; mouth contracted?; no lateral expansion.

Dimensions.—Length exclusive of whorl 1.8 in., diameter of whorl 1.3 in., greatest width of tube .6 in., (slightly compressed.)

Locality.—Ripley Group, Eufala, Alabama. Prof. Holmes.

From a careful study of the species of this genus I am satisfied that it is distinct from *Serpula*, although Bronn in his "Index Palæontologicus" so refers it.

I have seen a large number of specimens of *H. onyx* and *H. squamosus*, and have never been able to detect any sign of attachment to another substance. They appear to have constituted a distinct genus of serpuloid animals, always free, with a hook-like shell irregularly angular externally and round internally. The present species tends to confirm this opinion. I have seen several specimens and they all agree with the above statements.

FLABELLUM.

F. STRIATUM, *G. and H.* Pl. 69, fig. 10, 11. Thick, wedge shaped; angles of case acute; laminæ thin, edge finely crenate, slightly undulate; sides coarsely granulous, granules regularly arranged in striæ, towards the edge of the laminæ fine.

Locality.—Rotten limestone of Prairie Bluff, Alabama.

TROCHOSMILIA, *M. Edw.*

T. CONOIDES, *G. and H.* Pl. 69, fig. 12, 14. Resembles closely *T. Mortoni*, above described, differing in its much more robust form and the finer striæ exteriorly which are granulous.

Locality.—Cretaceous, N. J.

PLATYTROCHUS.

P. SPECIOSUS, *G. and H.* Pl. 69, fig. 15, 17. Conical, laminæ exsert, denticulate and granulous; exterior coarsely striate from the continuations of the exsert lamellæ, striæ alternating in size, coarsely granulous, often denticulate on the edge; depth of cup exceeding half the length of the mass.

Dimensions.—Length .5 in., breadth of top .57 in.

Locality.—Hardeman Co., Tenn. Prof. Safford.

These specimens are remarkable for their fine state of preservation. For distinctness, the lamellæ are not represented as numerous on fig. 15 as they really exist. Fig. 16 is correct in number.

HIPPOTHOA.

H. IRREGULARIS, *G. and H.* Pl. 69, fig. 18, 20.

Proc. Acad. Nat. Sci. 1860, p. 366.

Colony spreading, on shells, forming straight or but slightly curved lines; branching nearly at right angles, though generally from but one side of the cell; cells oval, flattened, placed closely together and united by a stout pedicle; opening nearly central with its greatest diameter in the direction of the length of the cell, often with an ovarian vesicle at the distal extremity.

Locality.—Timber Creek, N. J. Allied to *H. simplex*, d'Orb., in the shape of the cell.

CELLEPORA.

C. BILABIATA, *G. and H.* Pl. 69, figs. 21, 23.

Proc. Acad. Nat. Sci., p. 366, 1860.

Colony encrusting, generally in elongated patches; cells in lines, arranged in irregular quincunx, convex; opening, viewed from above, nearly circular; cell walls above and below the mouth project, forming two labiate processes.

Locality.—Timber Creek, N. J.

C. CARINATA, *G. and H.* Pl. 69, figs. 24, 26.

Proc. Acad. Nat. Sci., 1860, p. 266.

Colony incrusting; cells in quincunx; walls of cells meeting anteriorly, forming a carina, whose apex projects forward and towards the oral opening; apex often perforated; carina often diminishing as it approaches the cell below.

Locality.—Timber Creek, N. J.

C. TYPICA, *G. and H.* Pl. 69, figs. 27, 29.

Proc. Acad. Nat. Sci., 1860, p. 366.

Colony encrusting, in large patches; cells arranged in radiating lines, usually in quincunx, irregular exteriorly, small, rhomboidal; spaces between the oral openings wide, perforated by numerous, large accessory foramina. Encrusting a *Terebratula Harlani*, Morton, to which is also attached a specimen of *Ostrea panda*, M., formerly in Dr. Morton's collection, now in the collection of the Academy.

Locality.—Marl of New Jersey.

RETICULIPORA.

R. SAGENA, *G. and H.* Pl. 69, figs. 30, 32.

Proc. Acad. Nat. Sci., 1860, p. 366.

Colony large, (about one inch in diameter,) formed of plates; lateral plates not numerous, given off rectangularly; summit of plates perforated by cells, and thicker than the rest of the plate; lateral openings triangular, without any marked arrangement.

Locality.—Timber Creek, N. J.

Resembles *R. obliqua*, D'Orb.

REPTOMULTICAVA.

R. CEPULARIS, *G. and H.* Pl. 68, fig. 33, 35.

Proc. Acad. Nat. Sci., 1860, p. 367.

Colony irregular, nodulated, with a tendency to a pyramidal outline; cells elongated; hexagonal, large.

Locality.—Timber Creek, N. J.

MULTICRESIS.

M. PARVICELLA, *G. and H.* Pl. 69, fig. 36, 38.

Proc. Acad. Nat. Sci., 1850, p. 367.

Colony large, anastomosing in the manner of *Rhipidogorgia flabellum*: cells small, resembling those of *M. lanata*, D'Orb.; cellules wanting.

ADDENDA.

Eocene Species.

CIRSOTREMA, *Mösch.*

C. MEGAPTERA. Pl. 68, fig. 1. Elongated, scalariform; whorls seven or eight (?) apex broken; strongly cancellate, the transverse ribs being the smallest, and marked by large varices placed irregularly; the lower part of the body whorl has a carina about the size of the longitudinal ribs; aperture circular, with a very wide, irregular lip-like varix.

Locality.—Eocene, Ala. Dr. Spillman.

LEIORHINUS, n. g.

Fusiform; spire about as long as aperture; columella slightly twisted and with a fold or thickening on the edge, extending to the end of the canal; inner lip thickened and with one tooth near the suture; outer lip thickened posterior to the edge, edge thin and incurved, with a small emargination posteriorly, and opposite to the

tooth on the inner lip; no anterior sinus; surface smooth or only marked by lines of growth.

This genus appears to occupy a position between *CLAVATULA* and *PERRONA*. It differs from the former in being smooth, in having no anterior sinus and in the columella; from the latter by its higher spire and different general shape. It resembles more nearly some of the *FASCIOLARIAS* in outline.

✓ *L. CRASSILABRIS*. Pl. 67, fig. 60. Fusiform; whorls seven, rounded and slightly truncated above; apex acuminate; aperture irregularly oval, with small crenulations on the thickened portion, internally, of the outer lip; suture distinct, with a slightly depressed line on the upper part of the whorl, below the suture.

Locality.—Eocene, Claiborne, Ala. Collection of the Academy.

AXINÆA, Poli.

A. INTERCOSTATA. Pl. 68, fig. 2. Orbicular: beaks small, incurved; surface marked by numerous, compound ribs, composed generally of three, sometimes four, smaller ones and with smaller, transverse markings between these ribs; area very small, hinge teeth large, lower part of the internal edge crenulated.

Locality.—Eocene. Alabama. Dr. Spillman.

PECTEN, Linn.

P. SPILLMANI. Pl. 68, fig. 3. Equivalve, orbicular: surface marked by about twenty-two radiating ribs, each with one or two very small ones on each side, and with the crests of all minutely granulous; alations? (both ears are broken in the specimen before me).

Locality.—Eocene. Alabama. Dr. Spillman.

CRETACEOUS.

I have recognized a number of species of foramenifera, in a marl from near Mullica Hill, N. J., of the same age as the Timber Creek limestone (upper part of No. 5 of Meek and Hayden,) abounding in corals, the most common of which is *Eschara digitata*. The matrix is fortunately not so hard as that at Timber Creek, and both the corals and foramenifera are much better preserved. I shall not describe any at present, except the beautiful *Dentalina*, given below. I expect, however, at some not very distant period to characterize them. I have not yet seen *Cristellaria rotula*, said by Lyell to occur at Timber Creek, although I have examined several hundred specimens.

DENTALINA, D'Orb.

D. PULCHRA. Pl. 68, figs. 40, 41. Elongated, very slightly arcuate; cells large, more convex towards the large extremity; diameters of cells equal; surface marked

by about ten heavy, longitudinal ribs; sutures obliterated; opening small, tubulate and inclined in the direction of the curve.

Dimensions.—Length about .25 in., greatest diameter .03 in.

Locality.—Near Mullica Hill, N. J. My collection. Rare.

OSTREA, *Linn.*

O. TECTICOSTA. Pl. 68, figs. 47, 48. Elongated, irregularly oval, arcuate; beaks acuminate, ligament area triangular, oblique; muscular impressions rather large; lower valve generally attached, deep, usually deepest along the median line, but becoming flattened towards the basal margin; surface marked by numerous prominent, imbricating ribs, radiating from the middle line and not from the beaks; upper valve not so deep as the lower; surface only marked by the usual lines of growth; upper half of the internal margins of both valves denticulate, corresponding in the lower valve with the external plications.

Locality.—Cretaceous. Tennessee and New Jersey. My collection.

This species was sent to me last Spring, by Prof. Safford, when I referred it provisionally to *O. larva*, (*O. falcata*, Morton,) thinking it might be one of the many varieties of that species. I am now, however, satisfied that it is distinct. It is wider, the plications on the lower valve are more numerous, and have a different arrangement from *O. larva* and are imbricating, and the upper valve is not plicated. It has, besides, no alations near the beaks as in Lamarck's species. I have one specimen of a lower valve from New Jersey, kindly given me by my friend, Mr. C. C. Abbott.

BRYOZOA.

ACERVICLAUSA, n. g., *Gabb and Horn.*

Colony tubular, probably encrusting, consisting of numerous superposed layers, each layer covered with cells, surrounded by a space in which are no cellules; cellular margin slightly elevated, interspace of cells depressed.

Relations.—This genus is established from several well preserved specimens of one species, and appears to occupy a place intermediate between MULTICLAUSA and SEMI-MULTICLAUSA. The specimens are tubular and coarsely striate within.

A. VERMICULARIS, *G. and H.* Pl. 69, figs. 42, 44. Colony tubular, nodulate externally; cells small, uniform in size, with one side flattened, and with a tendency to an irregular, transverse linear arrangement. In the specimen figured there are eight layers of cells superposed.

Locality.—Near Mullica Hill, N. J., in the deposit mentioned above. My collection. Presented by Mr. Abbott. Rare.

HETEROCRISINA, n. g., *Gabb and Horn*.

Colony dendroid, fixed at its base, from which slightly flattened branches arise, dichotomous; branches provided with cells on their upper surface; cells oval, having their long diameter directed alternately to the opposite sides of the branch; laterally the cells are arranged in rows with flutings from one row of cells to the other: below, branches irregularly striate. The increase takes place only by additions to the extremity.

This genus occupies an intermediate place between FILICRISINA and BICRISINA, the former having one row of cells on the upper surface, the latter two, while HETEROCRISINA, from the peculiar arrangement of the cells on the upper surface, appears to occupy a transitional place between the one and two-rowed *Crisinidæ*.

H. ABBOTTII, *G. and H.* Pl. 69, figs. 45, 47. Colony formed of slender branches, slightly compressed; cells oval, edge rounded, slightly elevated, with a fine groove bounding the cell; lateral cells irregularly oval.

Locality.—With the above. My collection; from Mr. Abbott.

REFERENCE TO PLATE LXVII.

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| Fig. 1 to 4. <i>Belosepia unguia</i> . | Fig. 32. <i>P. carinata</i> , Con. |
| 5. <i>Natica hemicypta</i> . (Miocene.) | 33. <i>Cymbiola Texana</i> . |
| 6. <i>Cantharus Cumberlandianus</i> . " | 34. <i>Lunatia Moorei</i> . |
| 7. <i>Fasciolaria Woodii</i> . " | 35. <i>Neverita arata</i> . |
| 8. <i>Turris cristata</i> . | 36. <i>Spirorbis leptostoma</i> . |
| 9. <i>T. Moorei</i> . | 37. <i>Monoptygma crassiplica</i> , Con. |
| 10. <i>T. Kellogii</i> . | 38. <i>Architectonica Texana</i> . |
| 11. <i>T. Texana</i> . | 39. <i>A. vespertina</i> . |
| 12. <i>T. retifera</i> . | 40. <i>A. Meekana</i> . |
| 13. <i>T. nodocarinata</i> . | 41. <i>Serpula Texana</i> . |
| 14. <i>Neptunea enterogramma</i> . | 42. <i>Turritella nasuta</i> . |
| 15. <i>Fusus Mortoniopsis</i> . | 43. <i>Eulima exilis</i> . |
| 16. <i>Murex (Odontopolys) compsorhytis</i> . | 44. <i>E. Texana</i> . |
| 17. <i>Phos Texanus</i> . | 45. <i>E. tenua</i> . |
| 18. <i>Eucheilodon reticulata</i> . | 46. <i>Dentalium minutistriatum</i> . |
| 19. <i>Scobinella crassiplicata</i> . | 47. <i>Ditrupa subcoarctuata</i> . |
| 20. <i>S. læviplicata</i> . | 48. <i>Helcion Leanus</i> . |
| 21. <i>Distorsio septemdentata</i> . | 49. <i>Erato seminoides</i> . |
| 22. <i>Agaronia punctulifera</i> . | 50. <i>Bulla Kellogii</i> . |
| 23. <i>Mitra exile</i> . | 51. <i>Volvula Conradiana</i> . |
| 24. <i>M. Mooreana</i> . | 52. <i>V. minutissima</i> . |
| 25. <i>Mercenaria cancellata</i> . (Miocene.) | 53. <i>Crassatella antestriata</i> . |
| 26. <i>Ostrea Mauricensis</i> . " | 54. <i>Corbula Texana</i> . |
| 27. <i>Fasciolaria Moorei</i> . | 55. <i>Noetia pulchra</i> . |
| 28. <i>F. polita</i> . | 56. <i>Tellina Mooreana</i> . |
| 29. <i>Pseudoliva perspectiva</i> , Con. | 57. <i>Leda compsa</i> . |
| 30. <i>P. fusiformis</i> , Con. | 58. <i>Cibota Mississippiensis</i> . |
| 31. <i>P. linosa</i> , Con. | 59. <i>Anomia ehippioides</i> . |
| | 60. <i>Leiorhinus crassilabris</i> . |

REFERENCE TO PLATE LXVIII.

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| Fig. 1. <i>Cirsotrema megaptera</i> . (Eocene.) | Fig. 11. <i>Lunatia Halli</i> . |
| 2. <i>Axinæa intercostata</i> . " | 12. <i>Turritella Saffordi</i> . |
| 3. <i>Pecten Spillmani</i> . " | 13. <i>T. Tennesseensis</i> , |
| 4. <i>Fusus Holmesianus</i> . | 14. <i>T. pumila</i> . |
| 5. <i>Neptunea impressa</i> . | 15. <i>T. Hardemanensis</i> . |
| 6. <i>Fasciolaria Saffordi</i> . | 16. <i>Serpula habrogramma</i> . |
| 7. <i>Rostellaria rostrata</i> . | 17. <i>Dentalium Ripleyanum</i> . |
| 8. <i>Cancellaria Eufalensis</i> . | 18. <i>Pholas cretacea</i> . |
| 9. <i>Cypræa Mortoni</i> . | 19. <i>Teredo irregularis</i> . |
| 10. <i>Chemnitzia occidentale</i> . | 20. <i>Gastrochacna Americana</i> . |

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| Fig. 21. <i>Isocardia</i> Conradi. | Fig. 35. <i>N. Eufalensis</i> . |
| 22. <i>Venus</i> Ripleyana. | 36. <i>Leda</i> protexta. |
| 23. <i>V.</i> Meekana. | 37. <i>L.</i> Slackiana. |
| 24. <i>Corbula</i> subcompressa. | 38. <i>Arca</i> Saffordii. |
| 25. <i>C.</i> crassiplica. | 39. <i>A.</i> (<i>Macrodon</i>) <i>Eufalensis</i> . |
| 26. <i>C.</i> <i>Eufalensis</i> . | 40. <i>Ostrea</i> crenulimarginata. |
| 27. <i>Astarte</i> oetolirata. | 41. " " |
| 28. <i>Crassatella</i> pteropsis. | 42. <i>Discoidea</i> occidentale. |
| 29. <i>Cardium</i> multiradiatum. | 43. " " ambulacre, above. |
| 30. <i>Modiola</i> Saffordii. | 44. " " " below. |
| 31. <i>M.</i> ovata. | 45. <i>Hamulus</i> squamosus. |
| 32. <i>Trigonia</i> <i>Eufalensis</i> . | 46. <i>H.</i> major. |
| 33. <i>Axinæa</i> rotundata. | 47. <i>Ostrea</i> tecticosta. |
| 34. <i>Nucula</i> distorta. | 48. " " |

REFERENCE TO PLATE LXIX.

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| Fig. 1—3. <i>Flabellum</i> pachyphyllum. | Gabb and Horn. (Eocene.) |
| 4—6. <i>Trochosmilia</i> Mortonii. | " " " |
| 7—9. <i>Cylicosmilia</i> caulifera ? | " " " |
| 10—11. <i>Flabellum</i> striatum. | " " (Cretaceous.) |
| 12—14. <i>Trochosmilia</i> conoides. | " " " |
| 15—17. <i>Platytrochus</i> speciosus. | " " " |
| 18—20. <i>Hippothoa</i> irregularis. | " " " |
| 21—23. <i>Cellepora</i> bilabiata. | " " " |
| 24—26. <i>C.</i> carinata. | " " " |
| 27—29. <i>C.</i> typica. | " " " |
| 30—32. <i>Reticulipora</i> sagena. | " " " |
| 33—35. <i>Reptomulticava</i> cepularis. | " " " |
| 36—38. <i>Multicresis</i> parvicella. | " " " |
| 39. <i>Desmatocium</i> trilobatum. | Gabb. " |
| 40—41. <i>Dentalina</i> pulchra. | " " |
| 42—44. <i>Acerviclausa</i> vermicularis. | G. & H. " |
| 45—47. <i>Heterocrisina</i> Abbottii. | " " |

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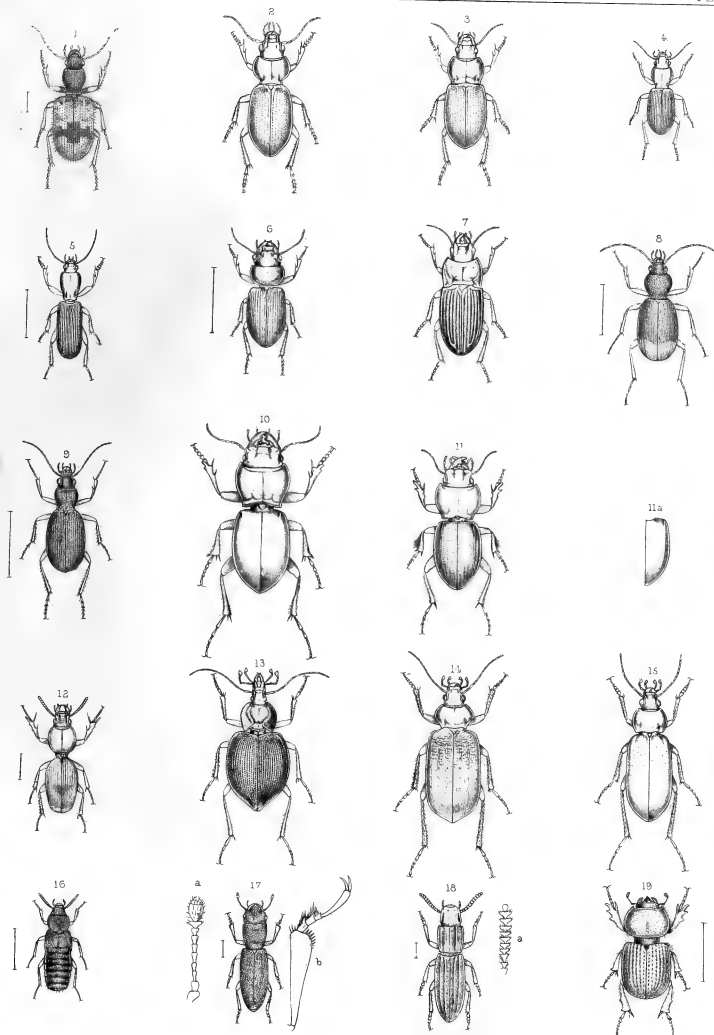
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NUMIDA PLUMIFERA.-CASSIN



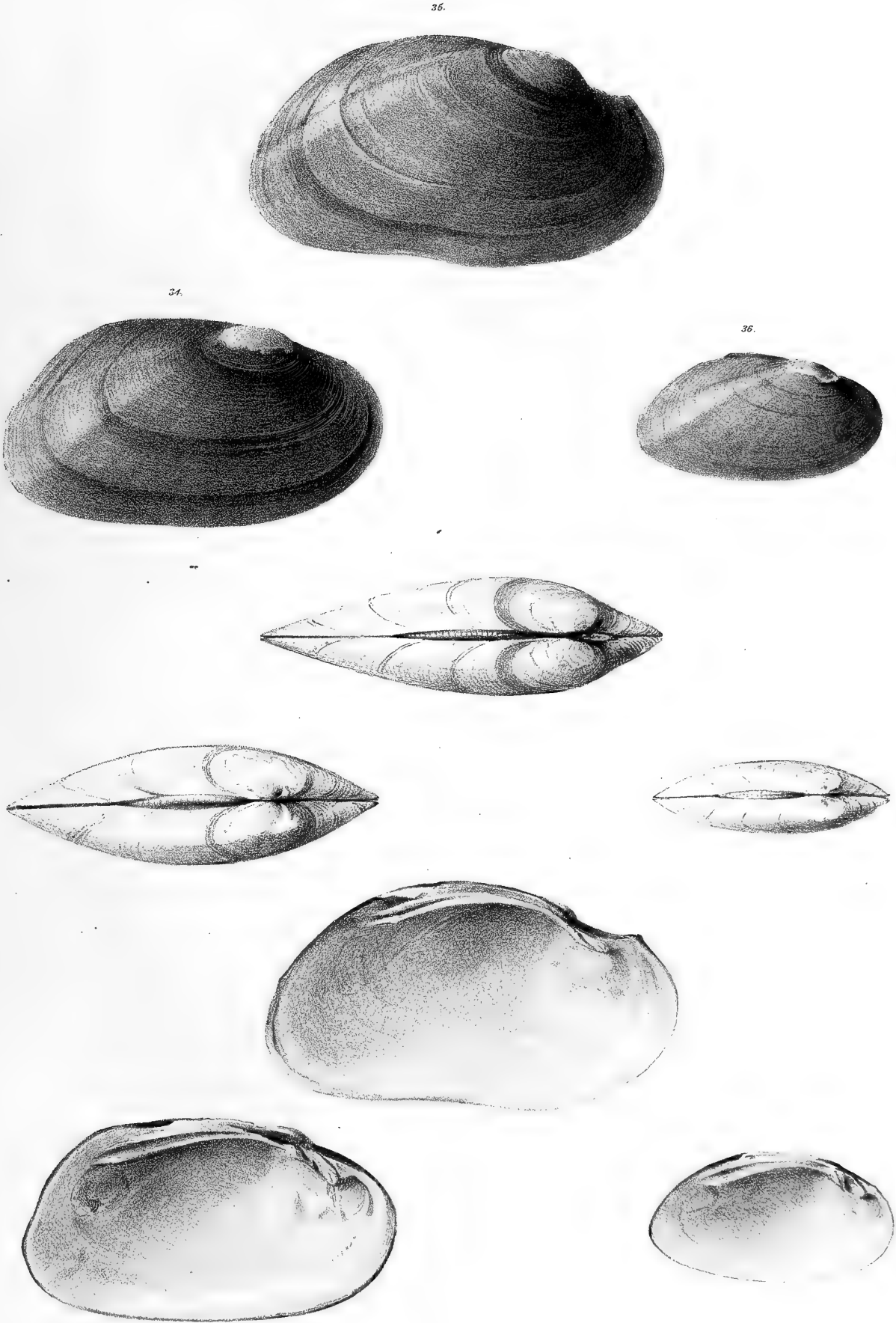
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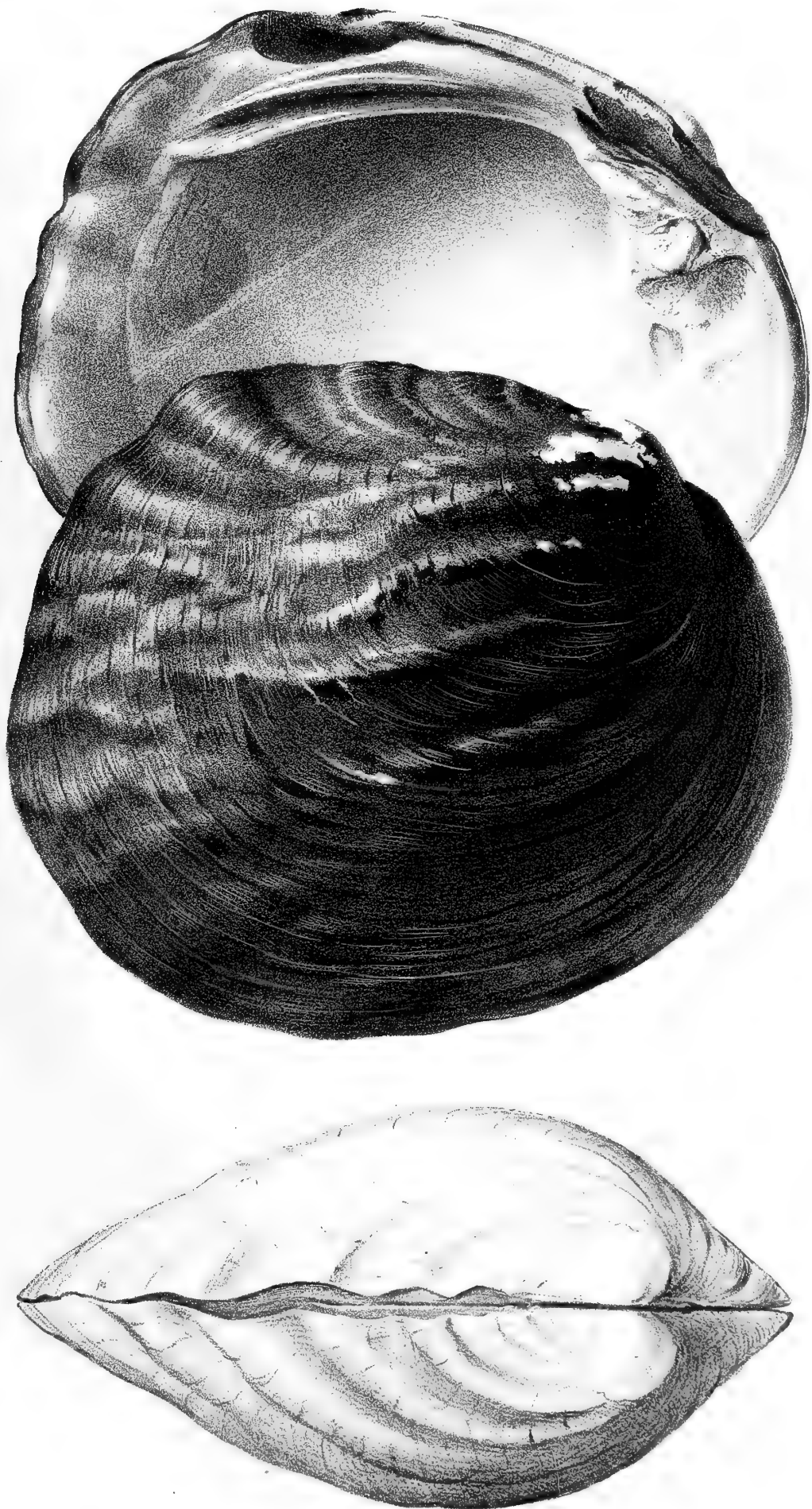




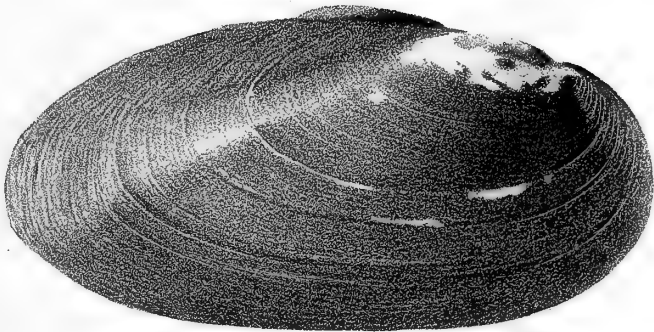
1. <i>Unio obtusus</i>	Lea.	11. <i>Unio rectus</i>	Lam	21. <i>Unio perplexus</i>	Lea	31. <i>Margaritana Hildebrandiana</i>	Lea.
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3. " <i>multiplicatus</i>	Lea.	13. " <i>occidens</i>	Lea	23. " <i>pressus</i>	Lea	33. " <i>ovata</i>	Lea
4. " <i>rutilans</i>	Lea	14. " <i>Novi-Eboraci</i>	Lea	24. " <i>levissimus</i>	Lea	34. " <i>decora</i>	Lea
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8. " <i>Pratii</i>	Lea.	18. " <i>ligamentinus</i>	Lam	28. " <i>triangulata</i>	Lea	38. " <i>undulata</i>	Say
9. " <i>spatulatus</i>	Lea	19. " <i>triangularis</i>	Bar	29. " <i>complanata</i>	Lea	39. <i>exam of U. subangulatus</i>	Lea
10. " <i>luteolus</i>	Lam	20. " <i>radiatus</i>	Lam	30. " <i>deltoidea</i>	Lea		



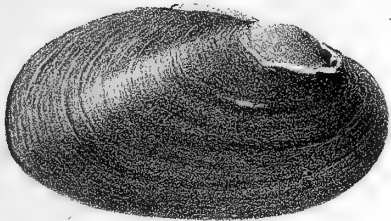
34. *Unio Abbevillensis.*
35. *Unio Jamesianus.*
36. *Unio subquibbosus.*



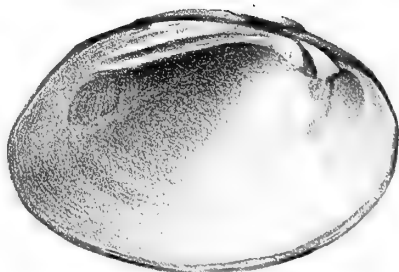
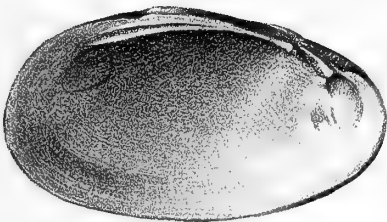
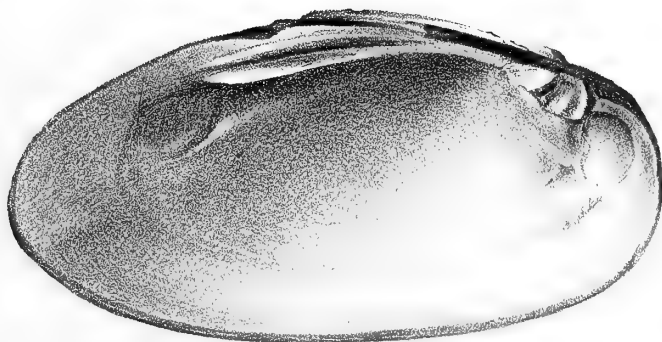
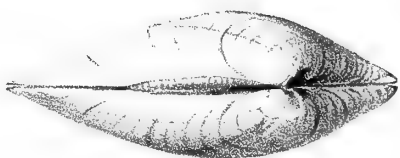
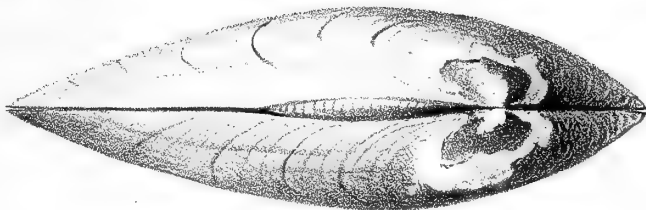
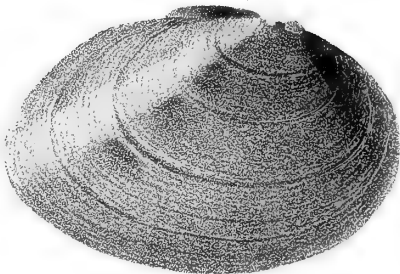
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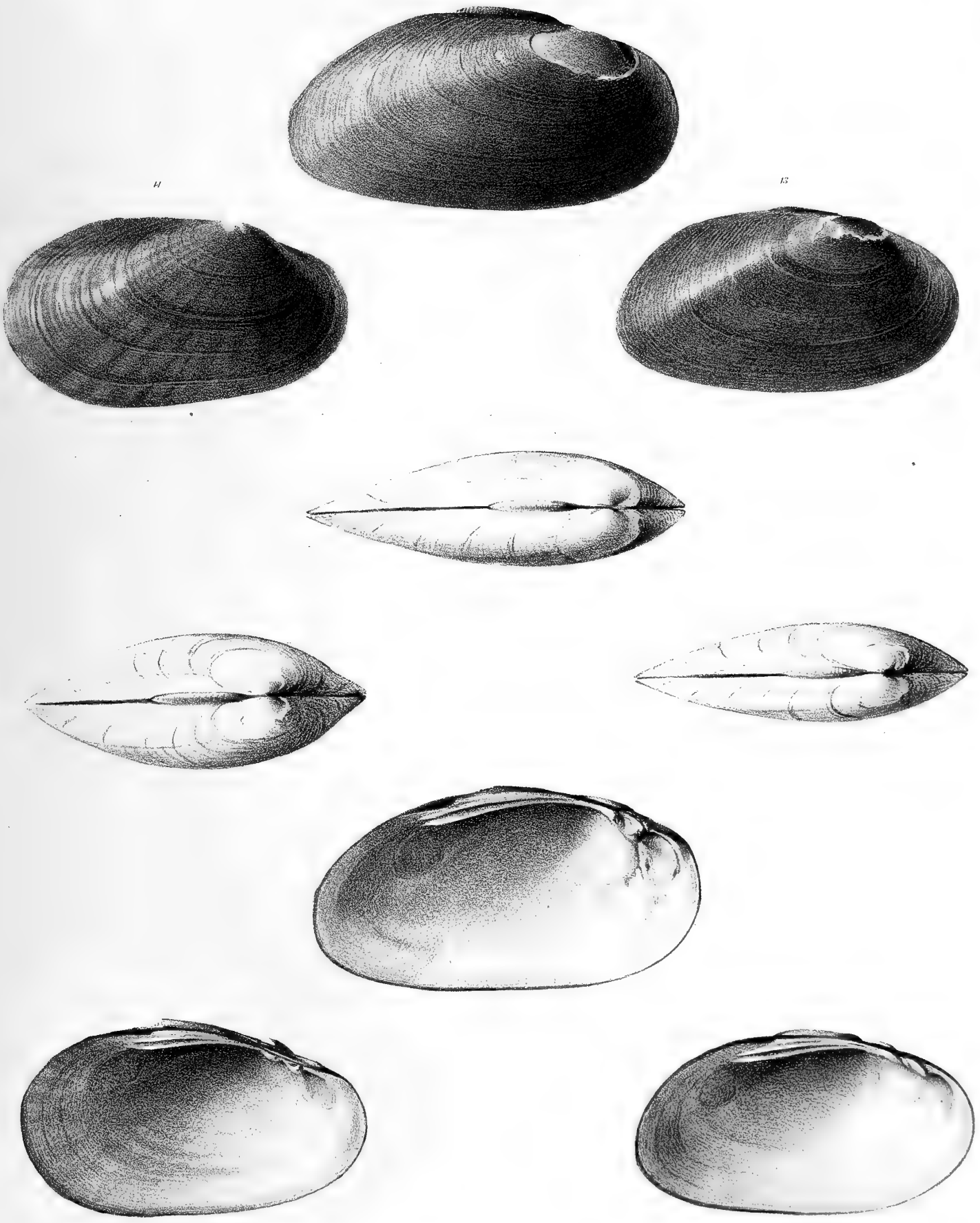


38. *Unio gracilior*
39. *Unio pullatus*
40. *Unio favius*

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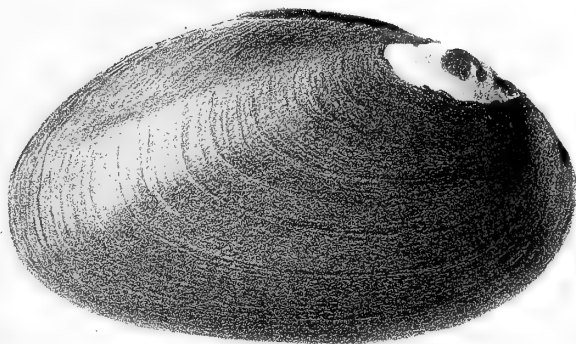
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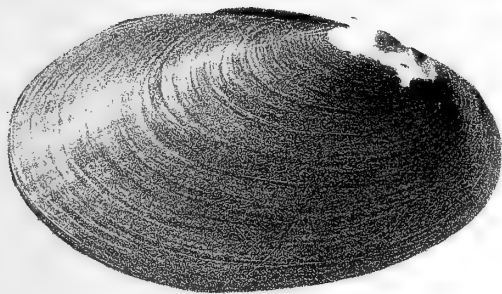


41. *Unio rutilans*
42. *Unio errans*
43. *Unio vicinus*

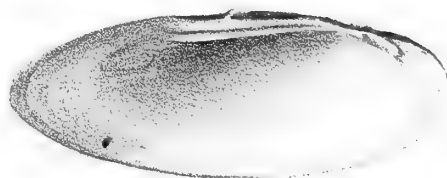
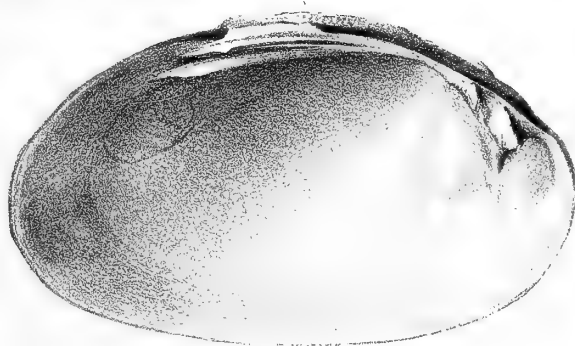
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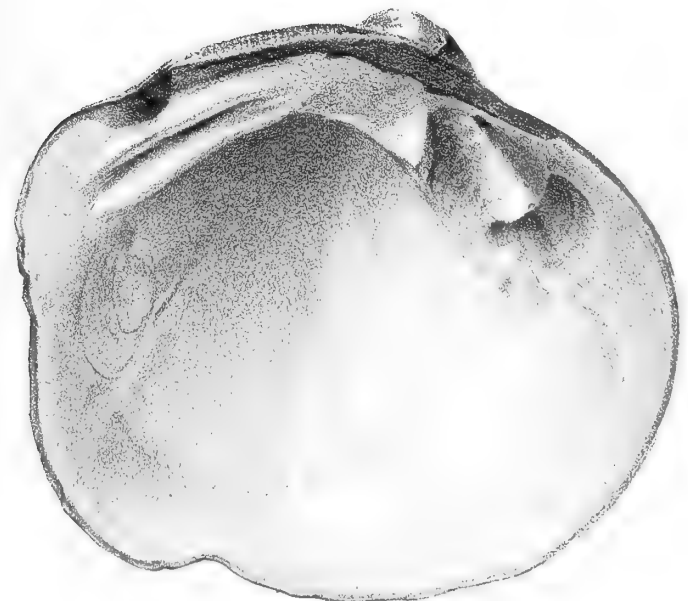
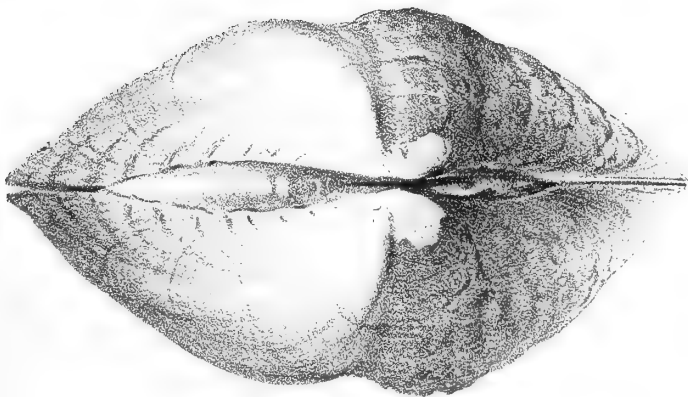
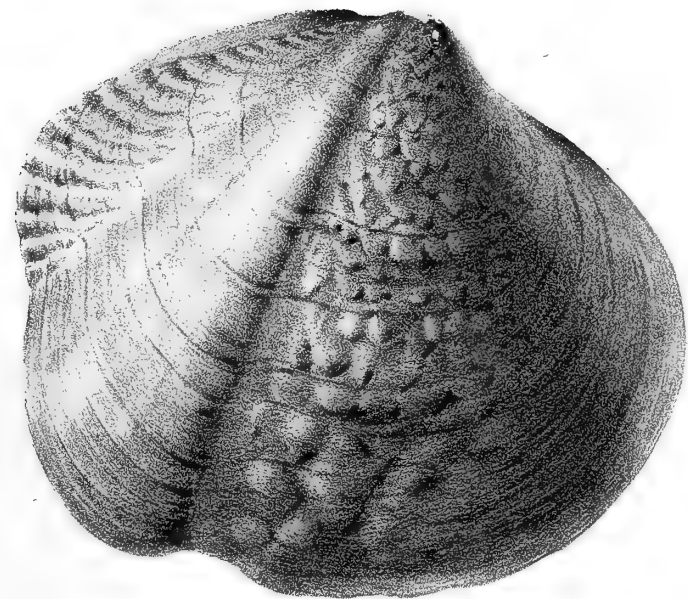


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- 44 *Unio subellipsis*
45 *Unio geminus*
46 *Unio rostriformis*

47.



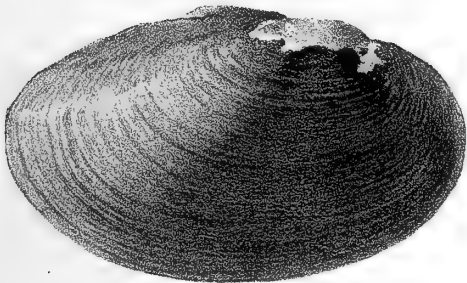
47. *Unio Blandianus*.



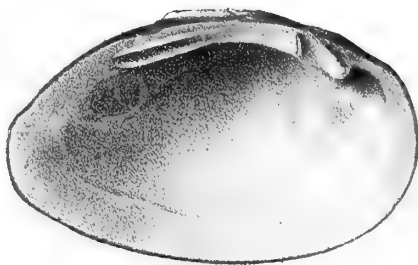
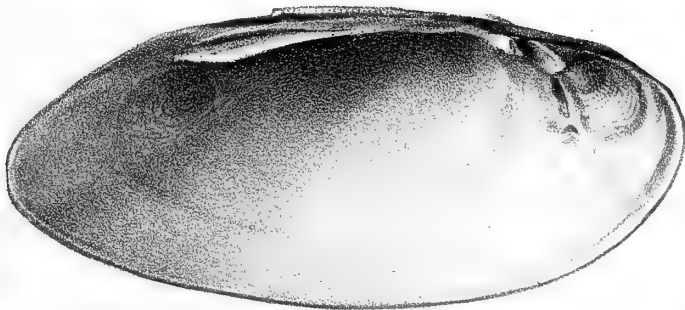
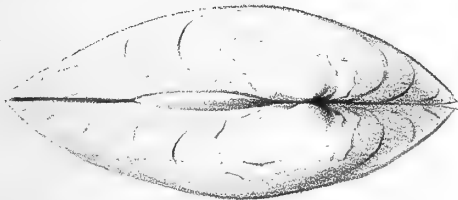
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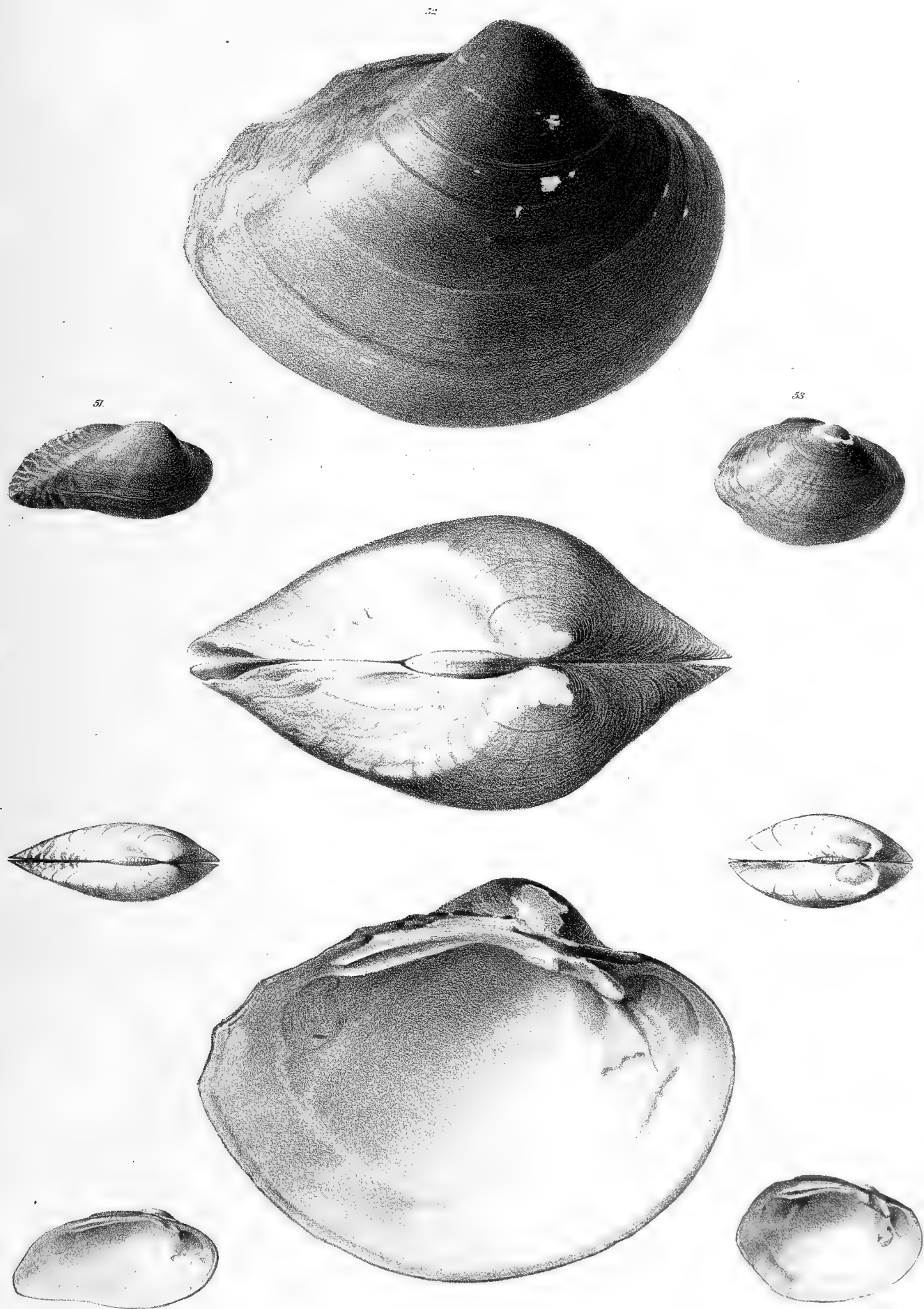
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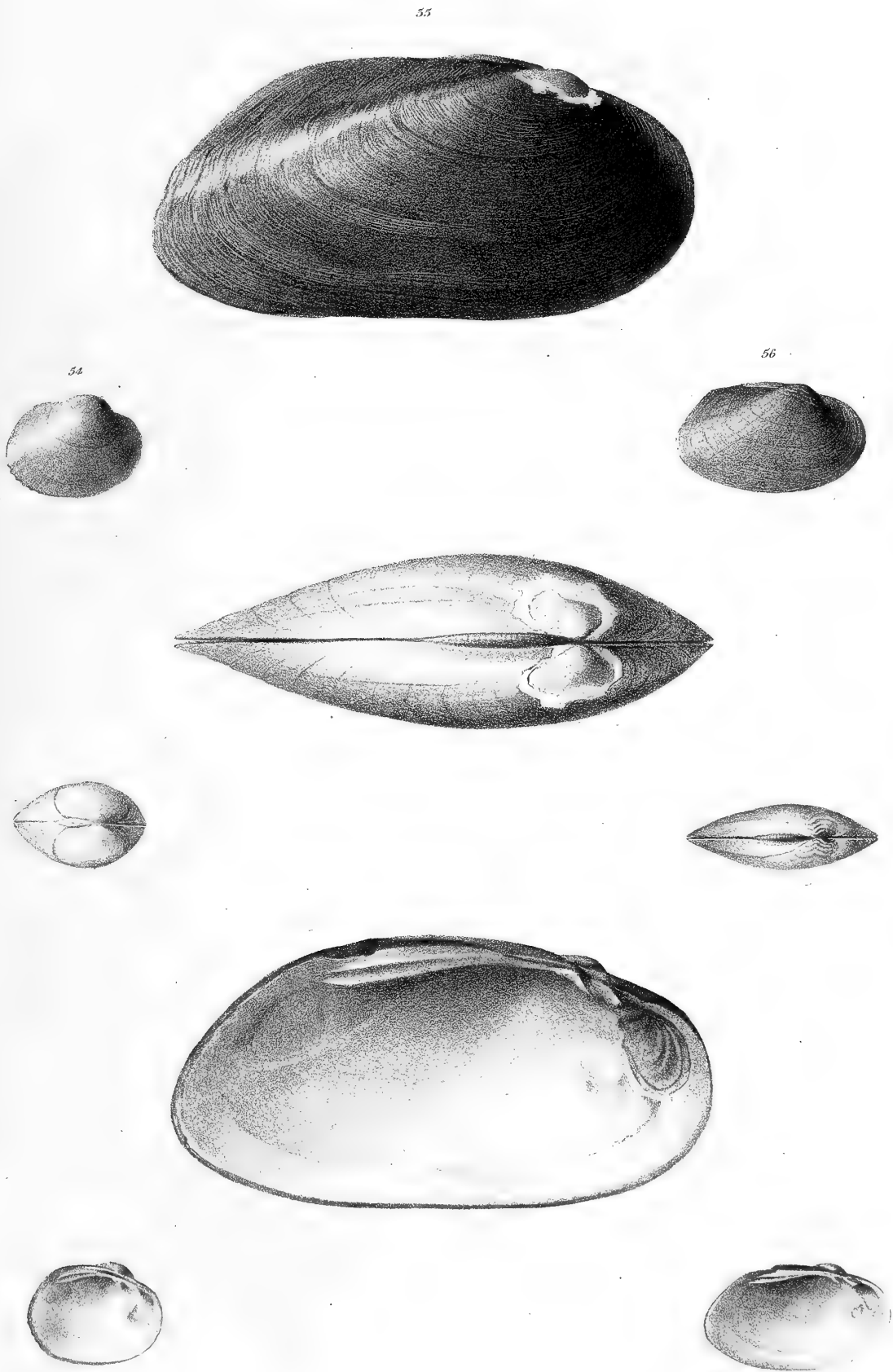
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48. *Unio concestatator*
49. *Unio extensus*
50. *Unio pyriformis*



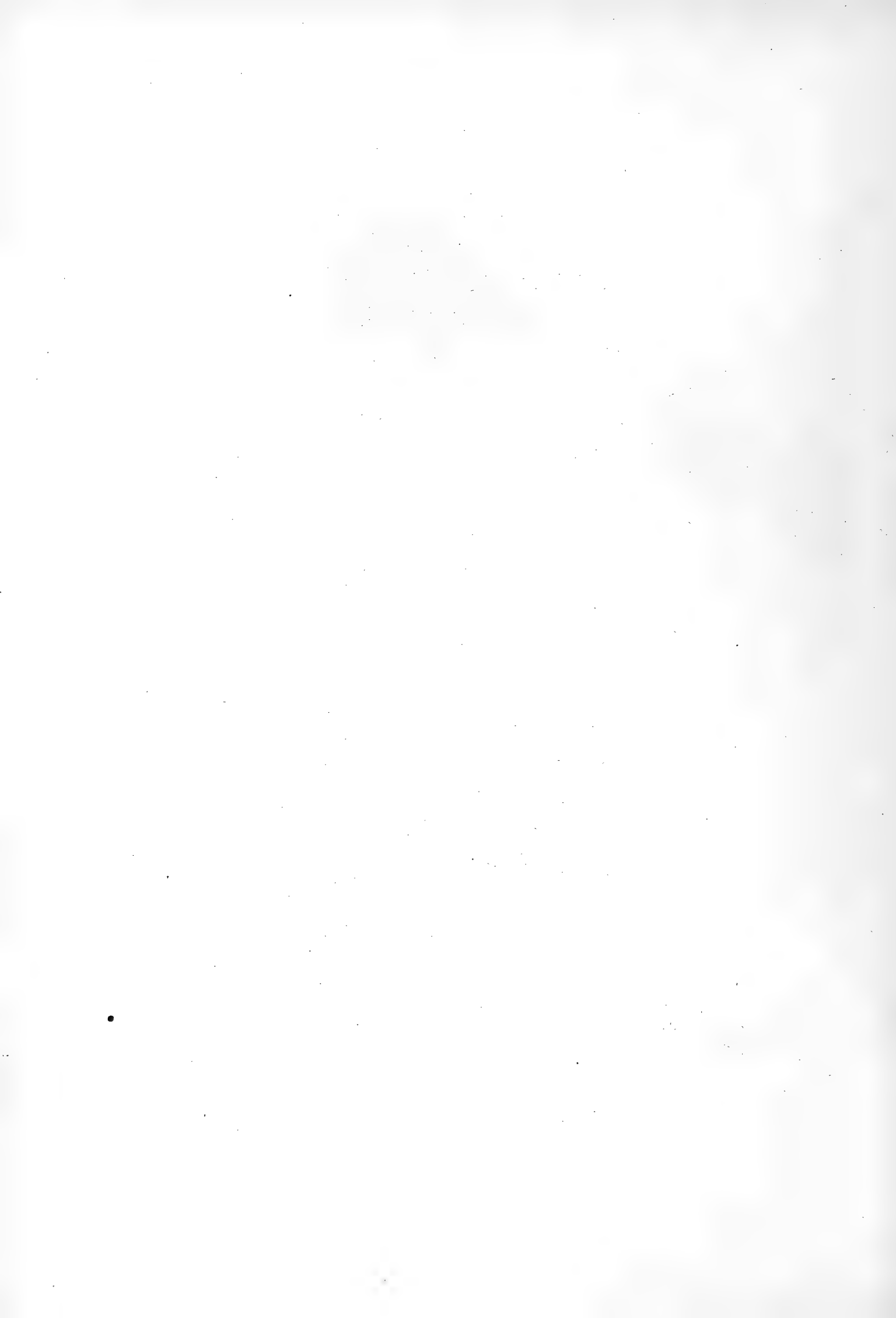
51 *Unio rubellinus*
52 *Unio excavatus*
53 *Unio umbrans*



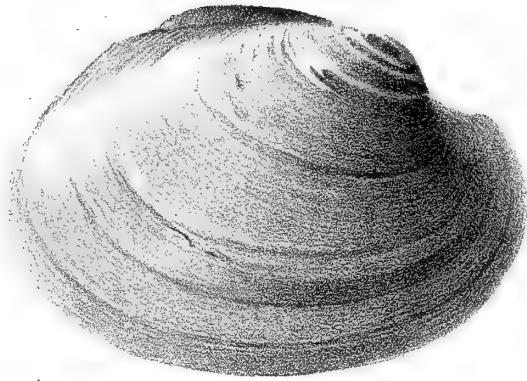
54. *Unio Olkaloogensis*
55. *Unio Columbensis*
56. *Unio apicinus*

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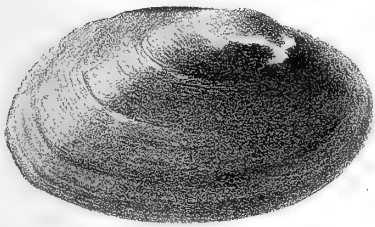
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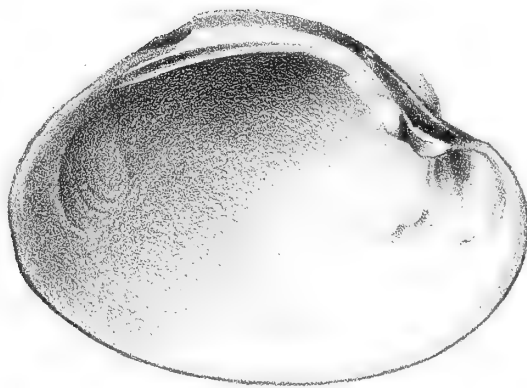
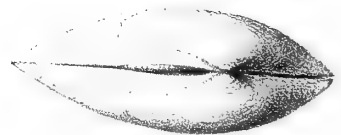
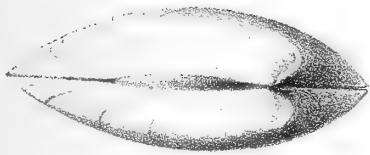
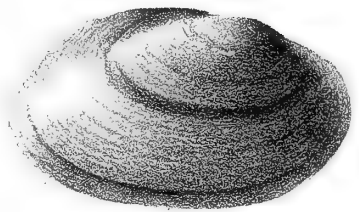
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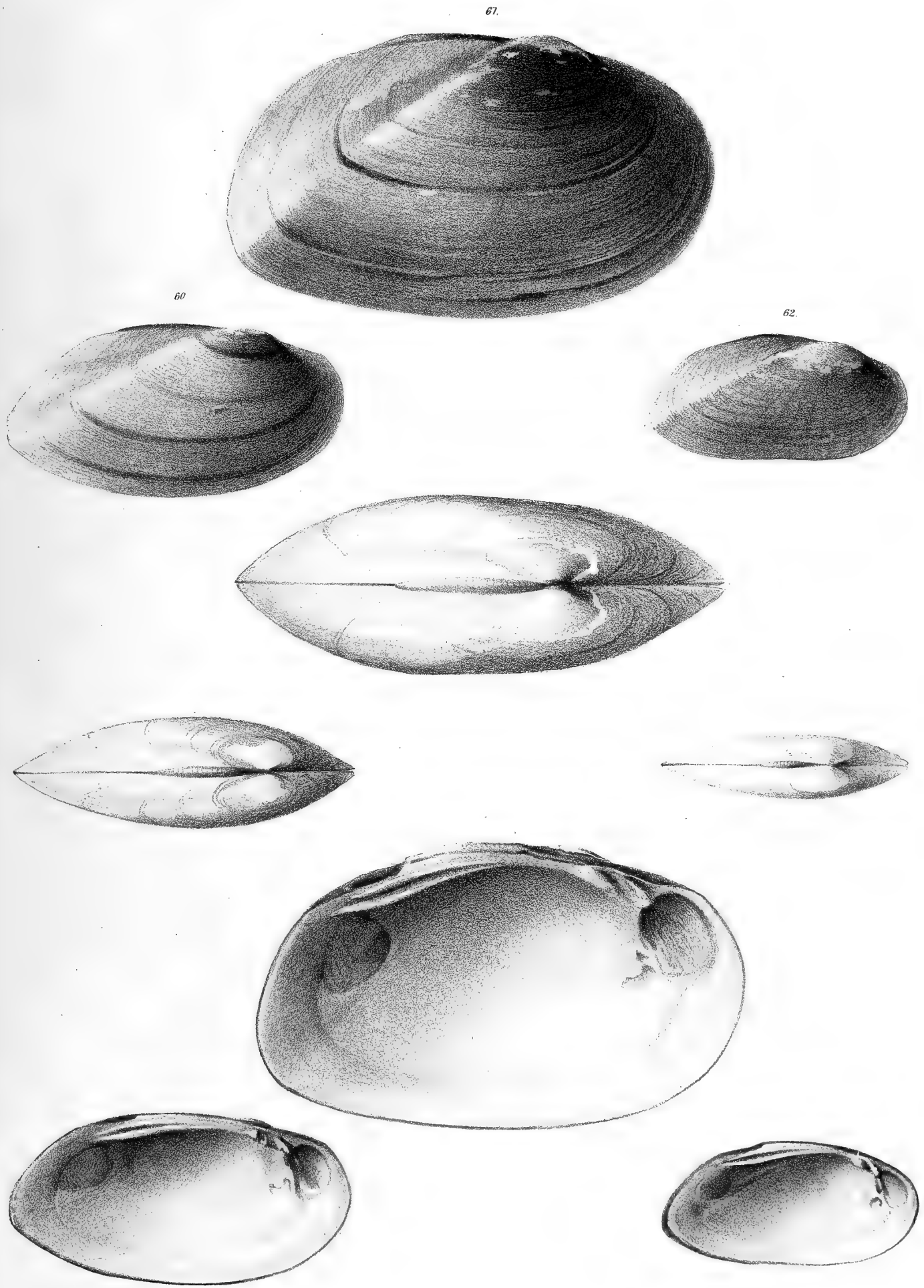
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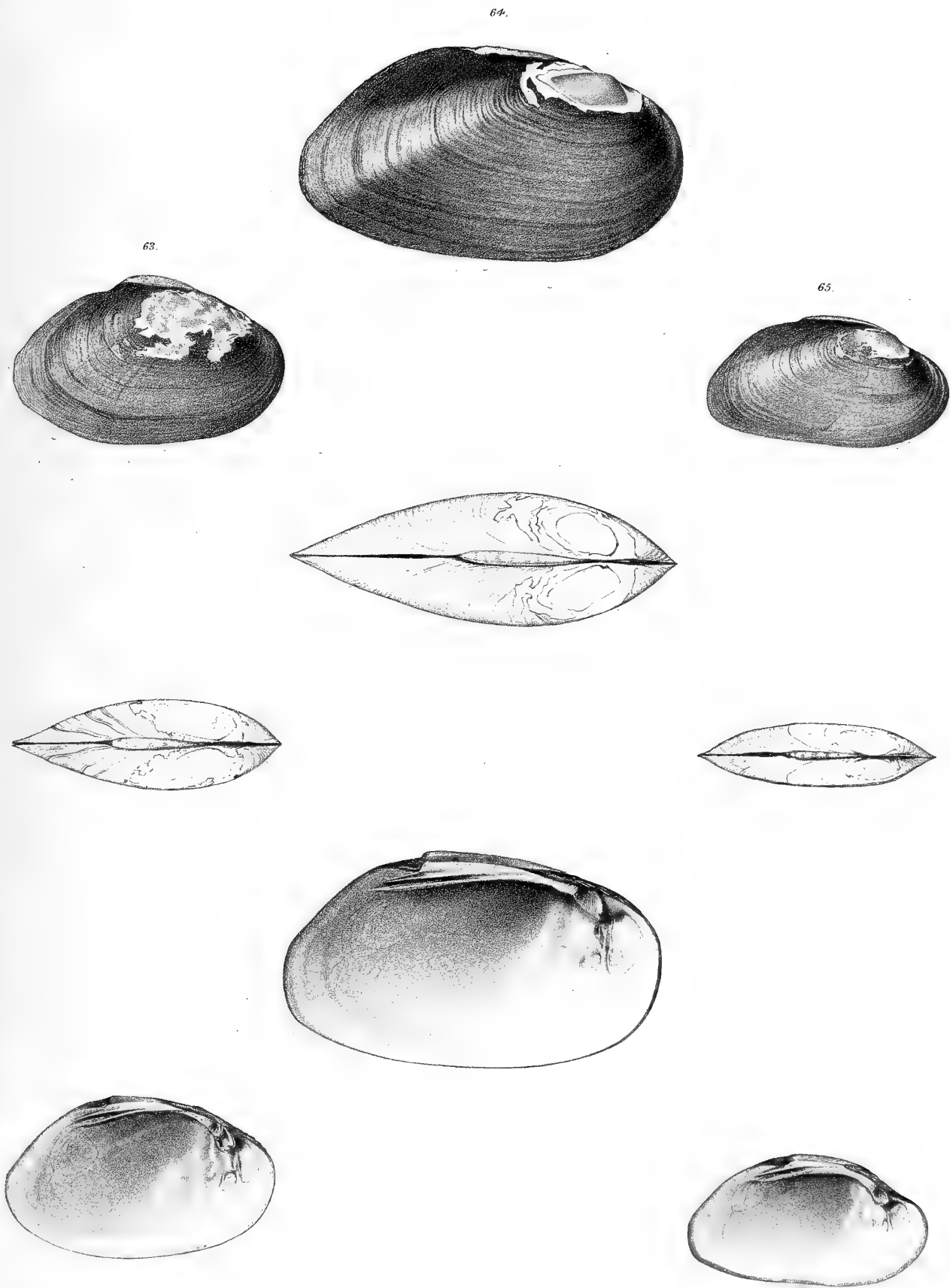
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57. *Unio intercedens*.
58. *Unio pinguis*.
59. *Unio fallax*.

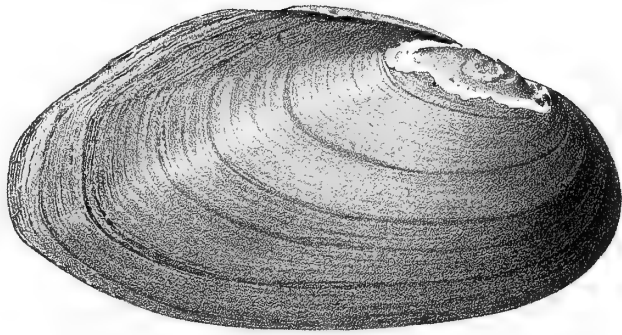


60. *Unio virens*.
61. *Unio Savannahensis*
62. *Unio sublatus*

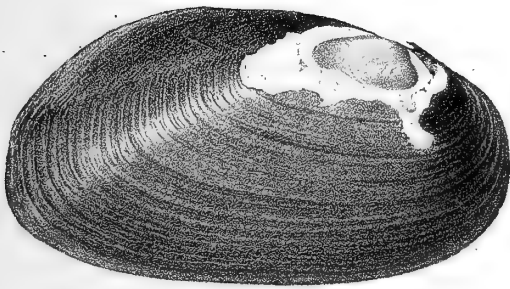


63. *Unio tenebrius*.
64. *Unio obtusidulus*
65. *Unio rufus*

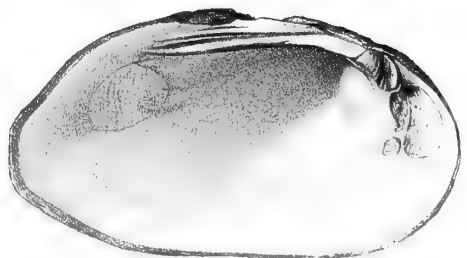
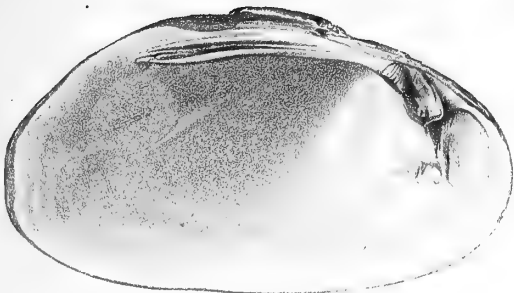
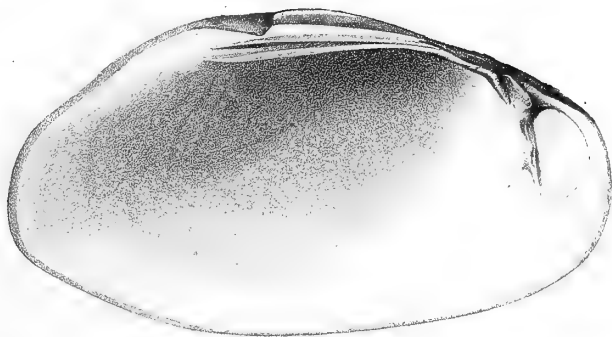
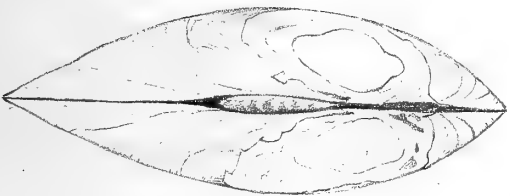
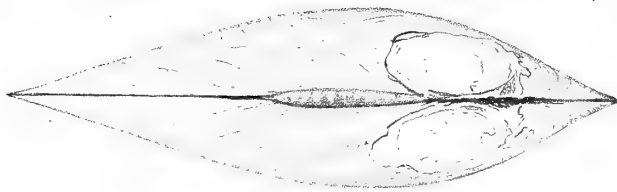
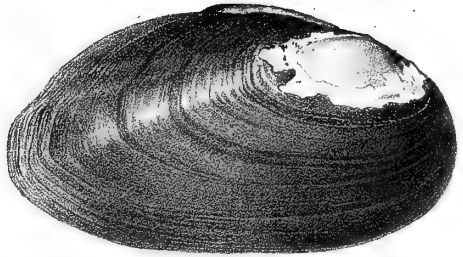
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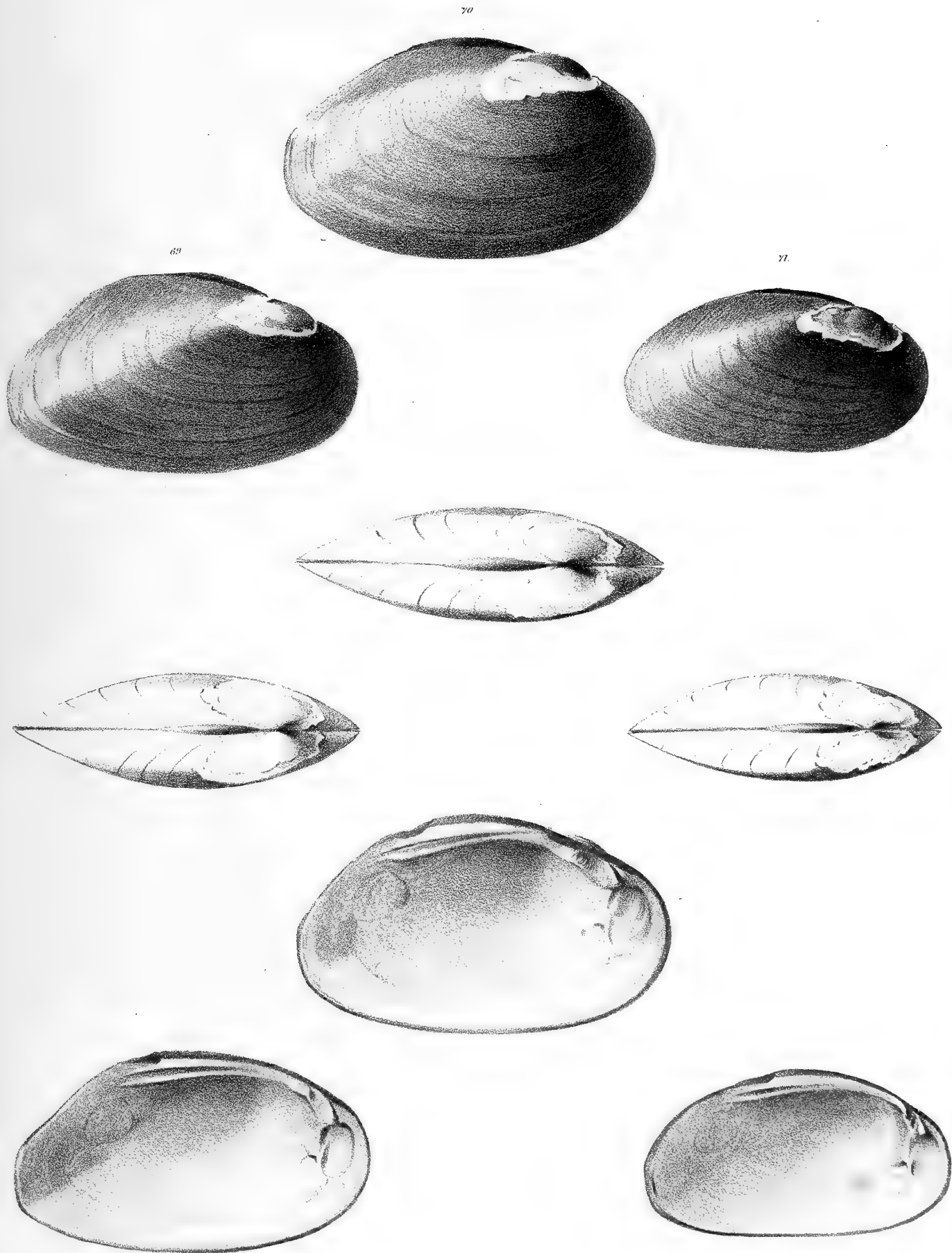
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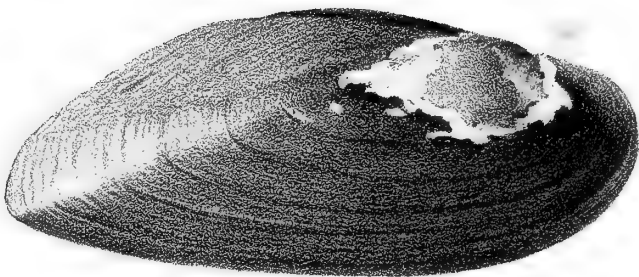
66. *Unio opacus*.
67. *Unio viridicatus*.
68. *Unio fumatus*.



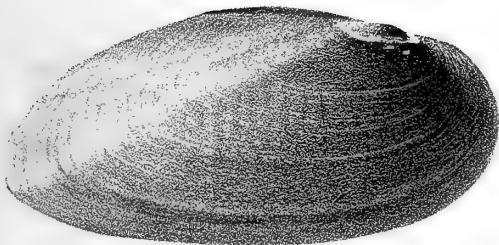
69 *Unio æquatus*
70 *Unio subflavus*
71 *Unio similis*.



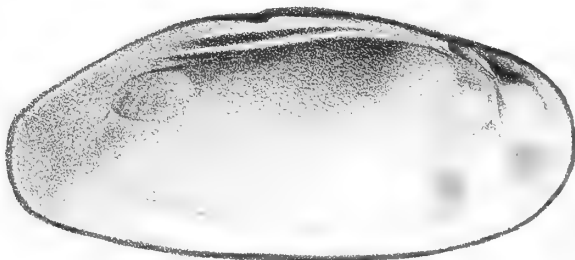
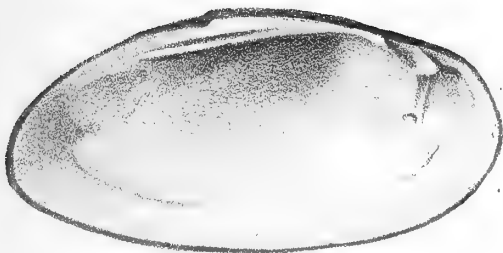
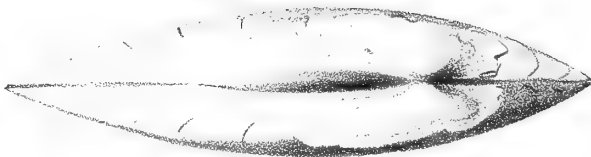
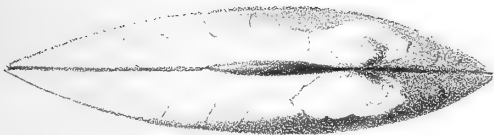
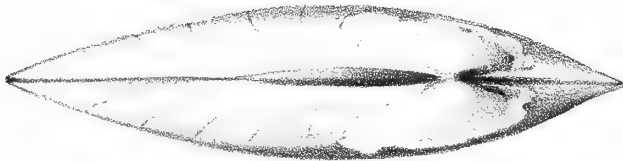
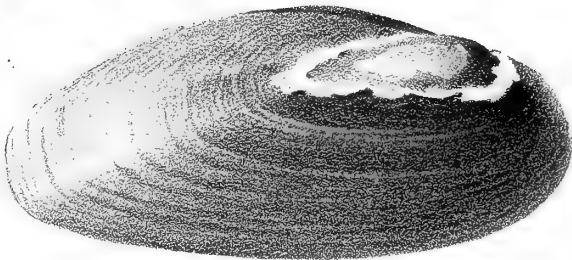
23



22



24



22 *Unio aquilus*.
23 *Unio Maconensis*
24 *Unio naviculoides*



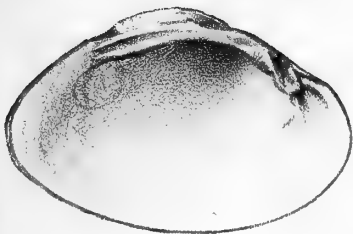
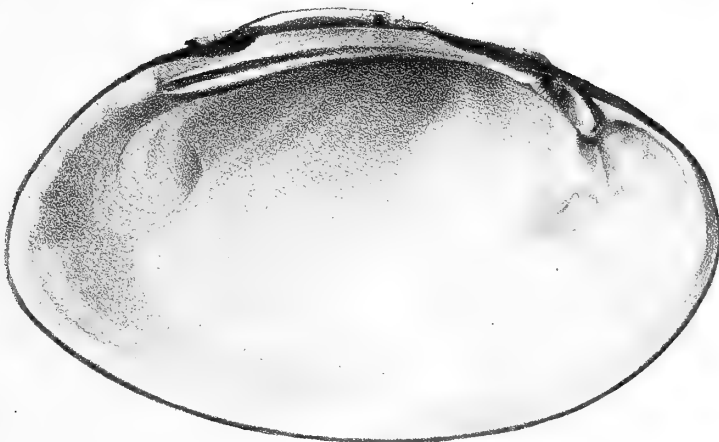
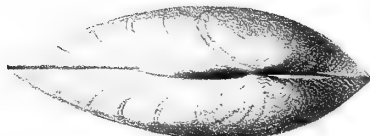
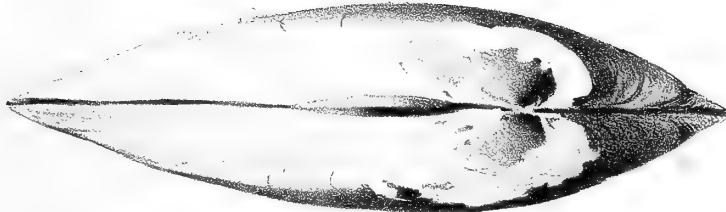
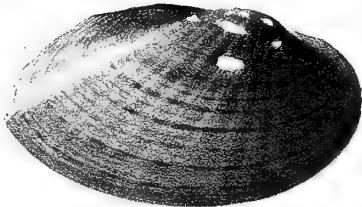
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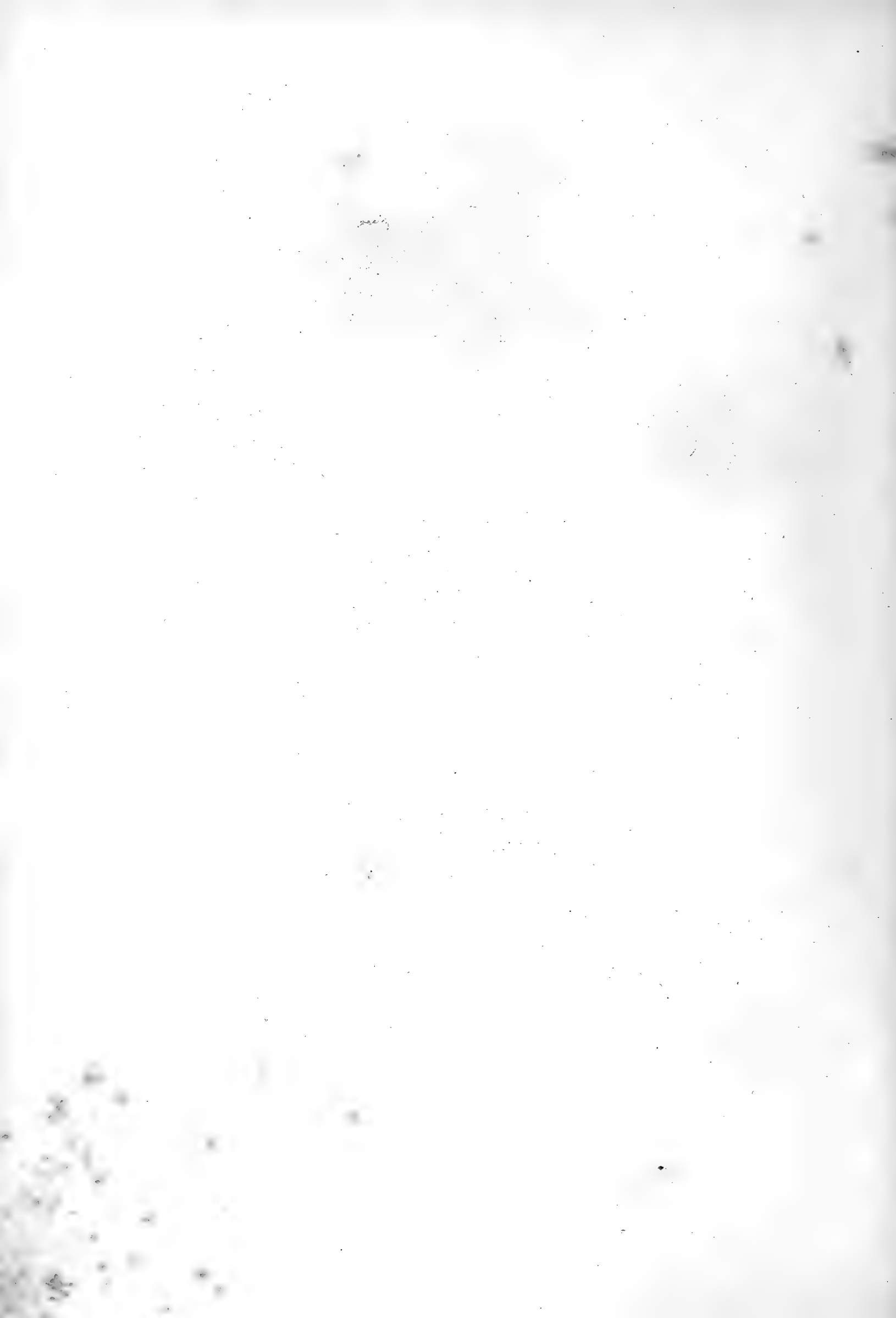
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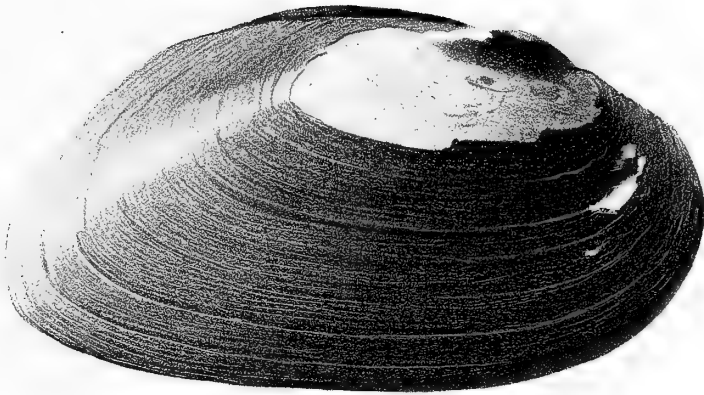
77



75 *Uro bulbosus*
76 *Uro Plantii*
77 *Uro sudus*



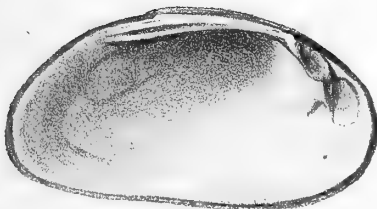
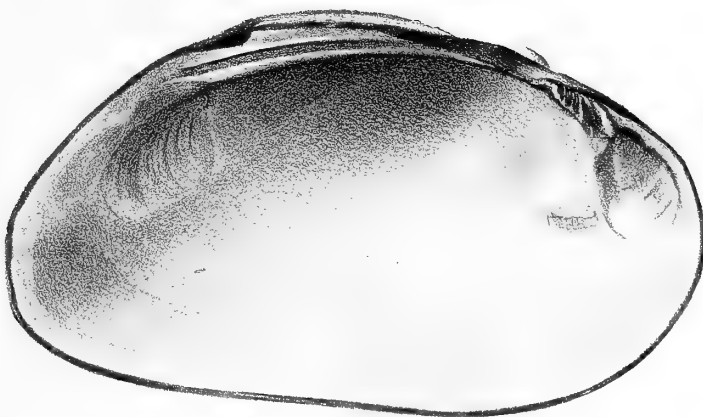
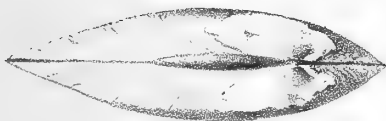
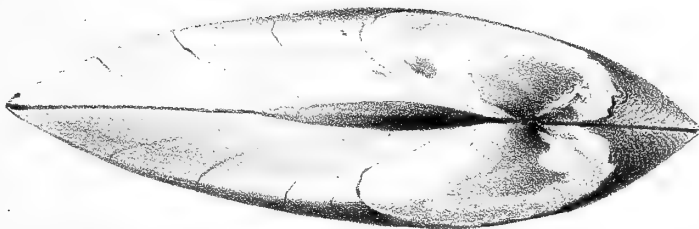
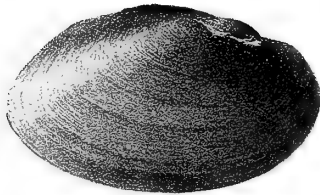
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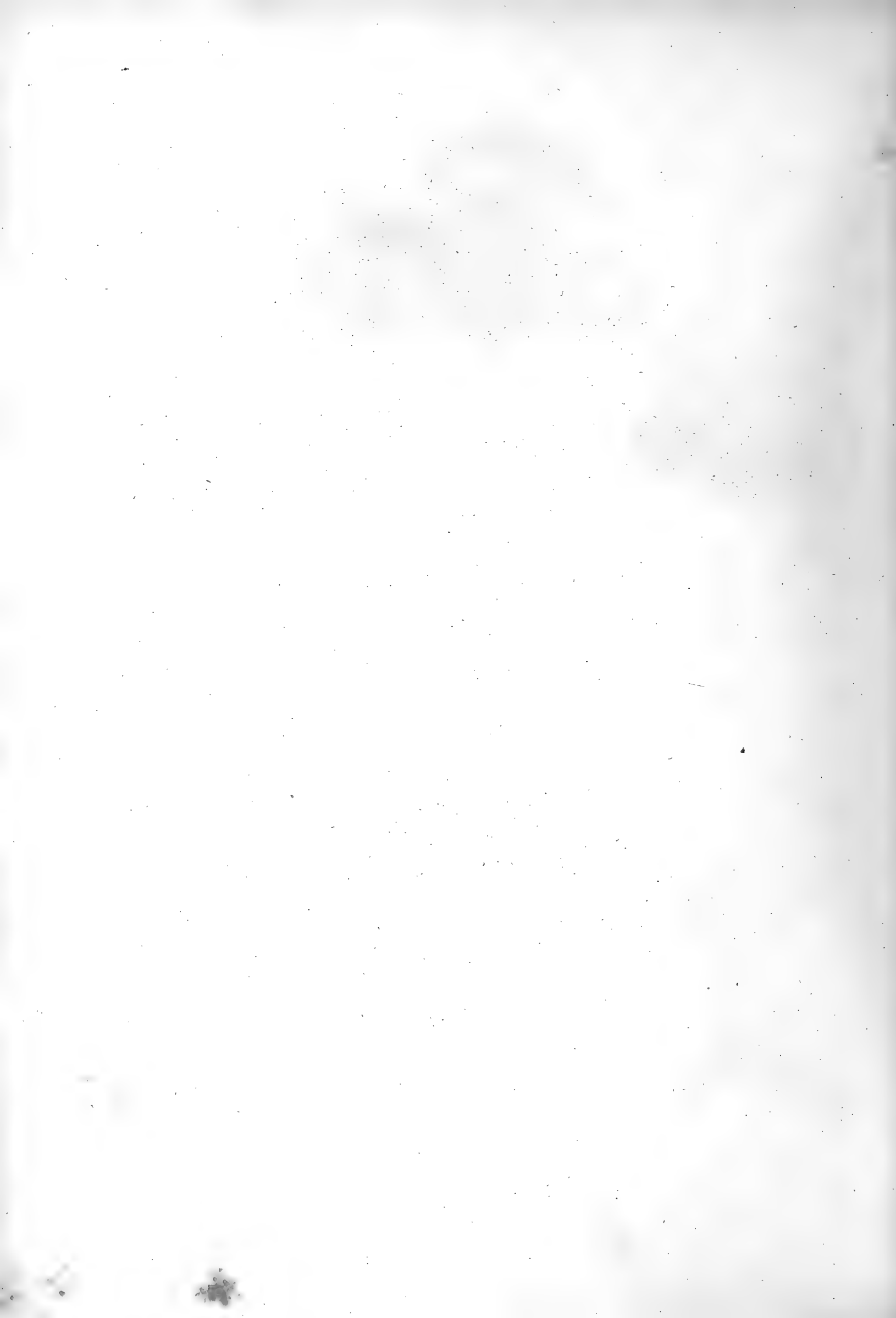
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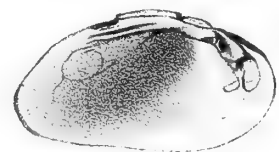
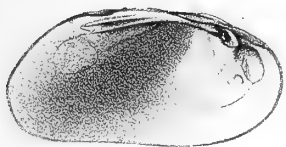
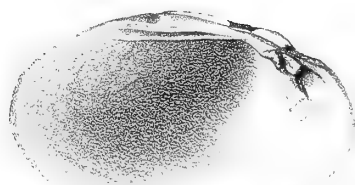
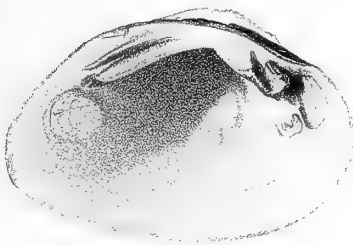
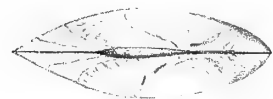
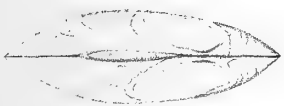
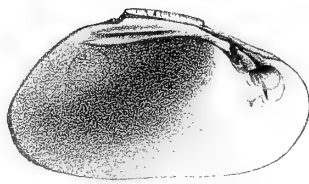
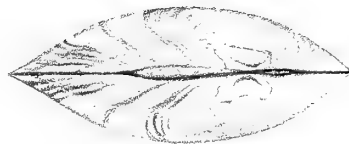
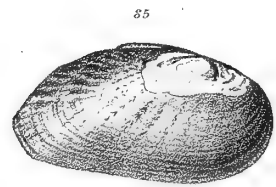
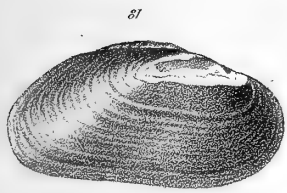
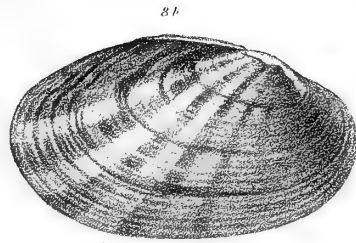
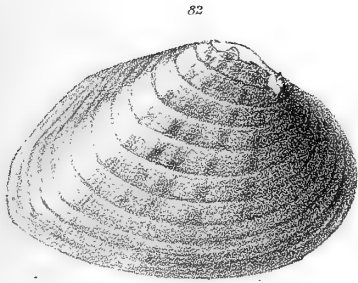
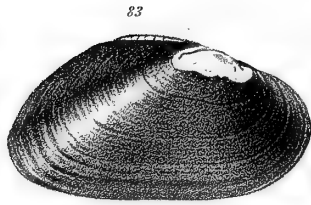


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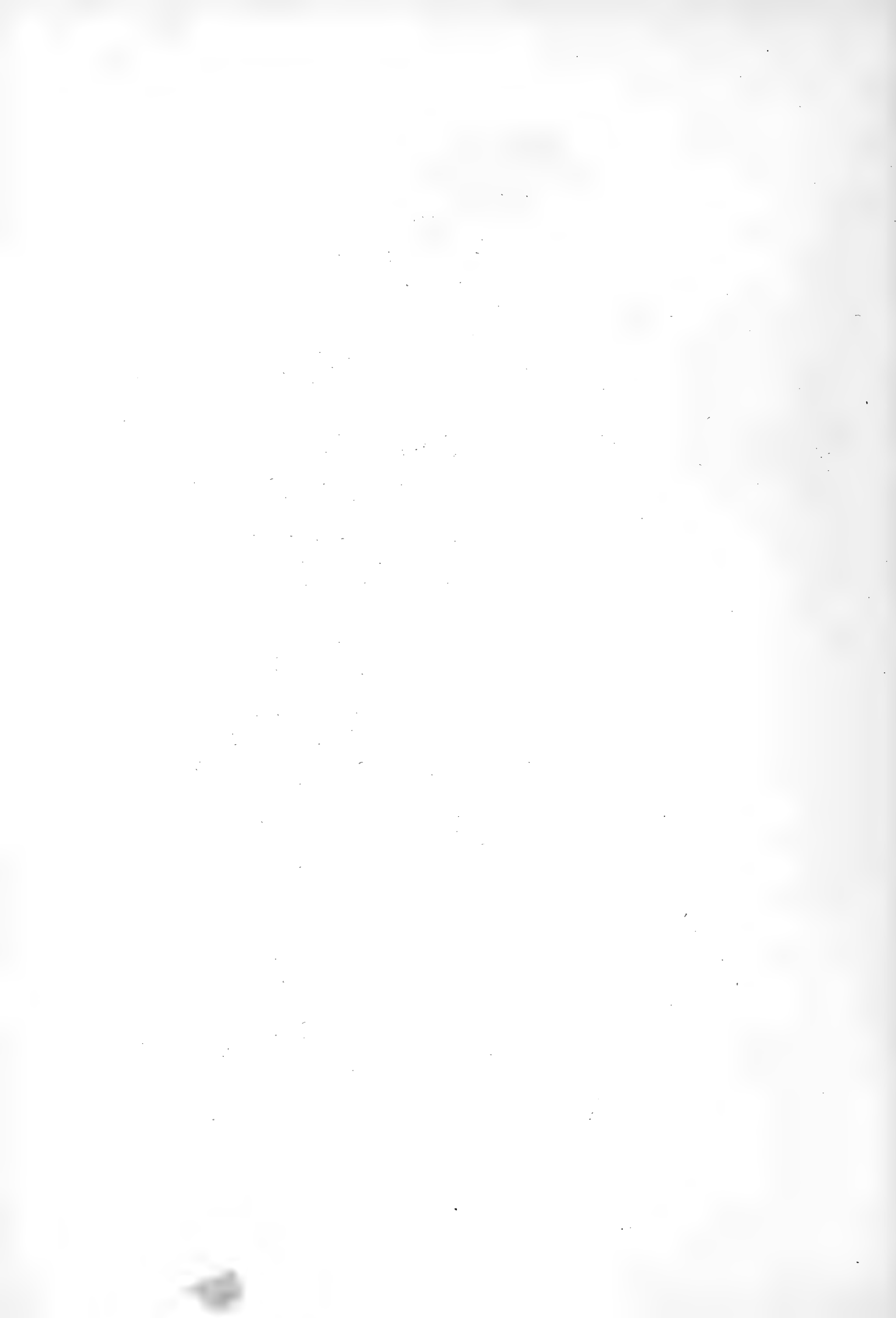


78. *Unio tetricus*
79. *Unio subniger*
80. *Unio obfuscus*

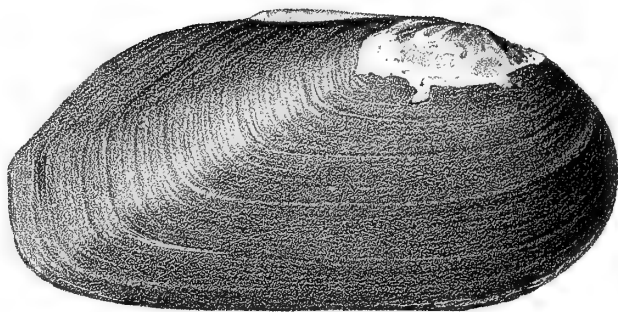




- 81 *Unio purpurellus*
82 *Unio Woodwardianus*
83 *Unio denigratus*
84 *Unio radians*
85 *Unio penicillatus*



87



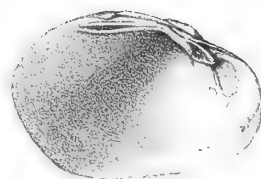
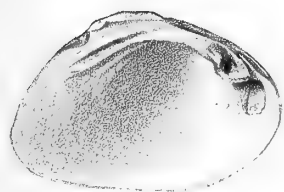
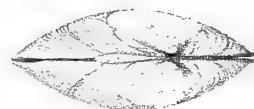
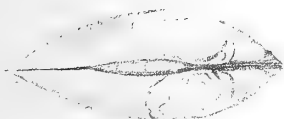
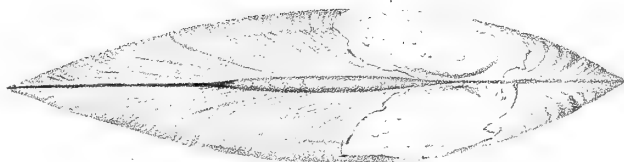
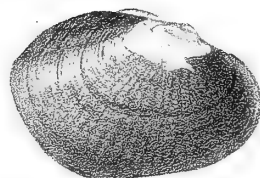
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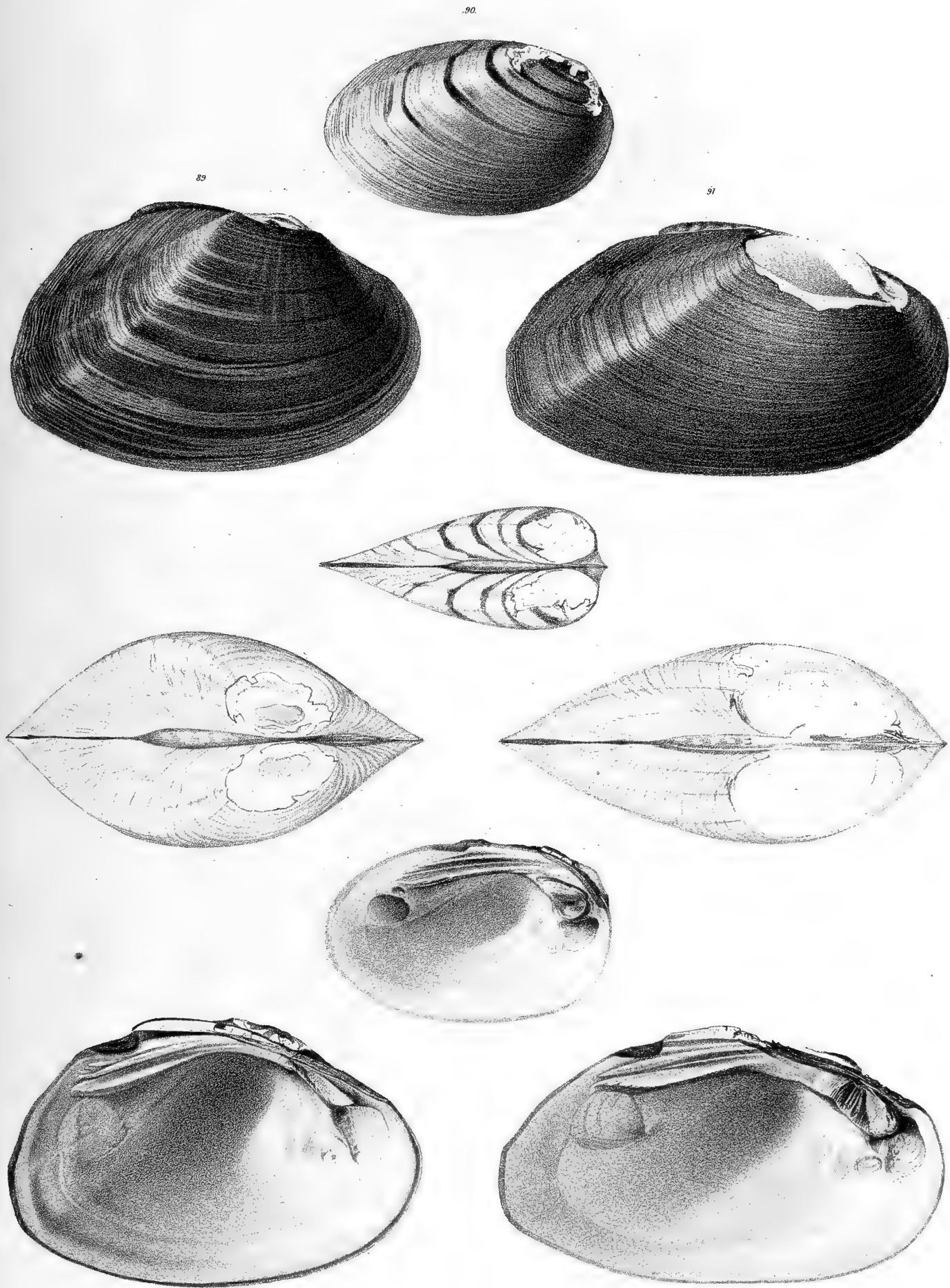
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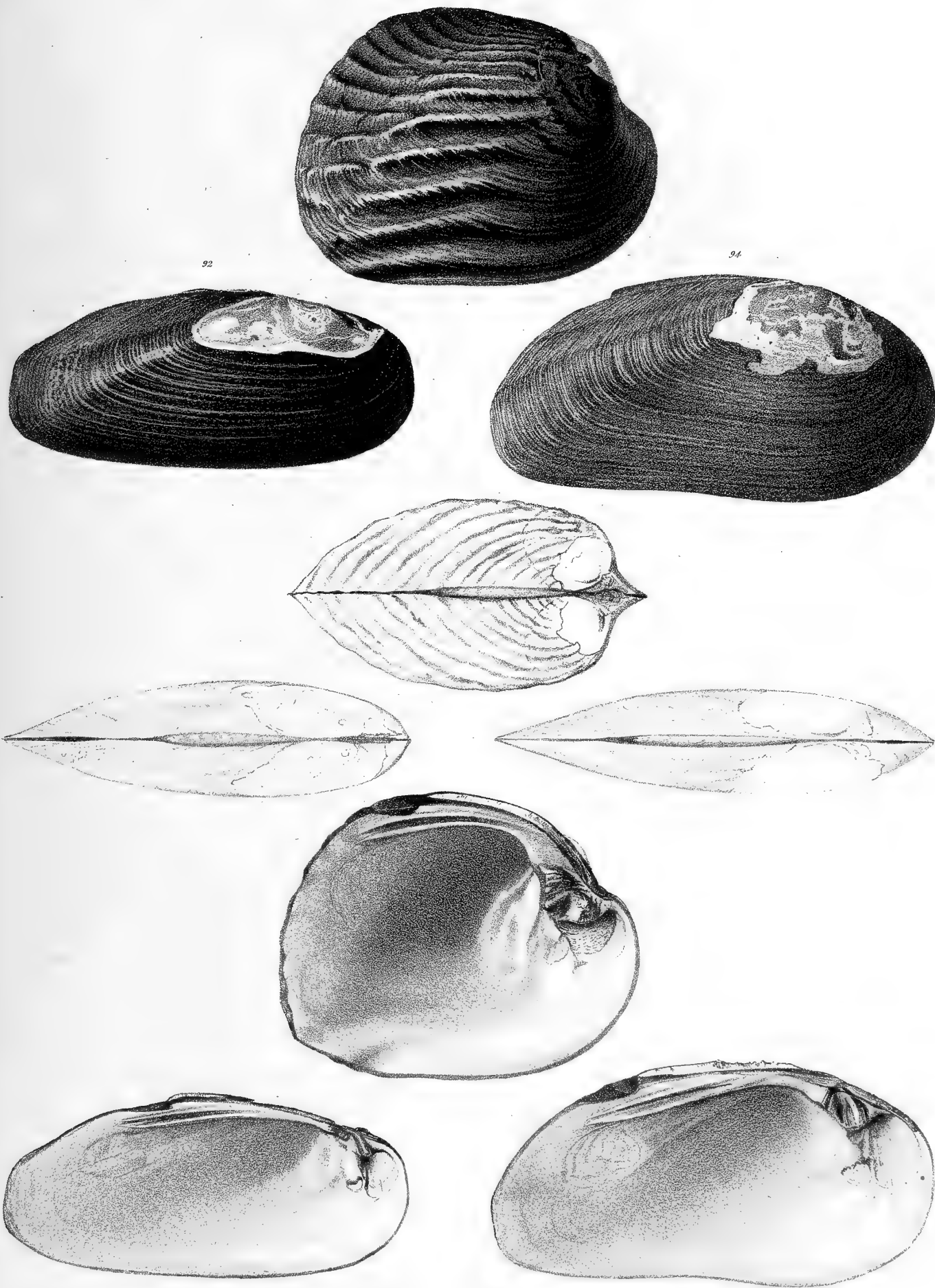
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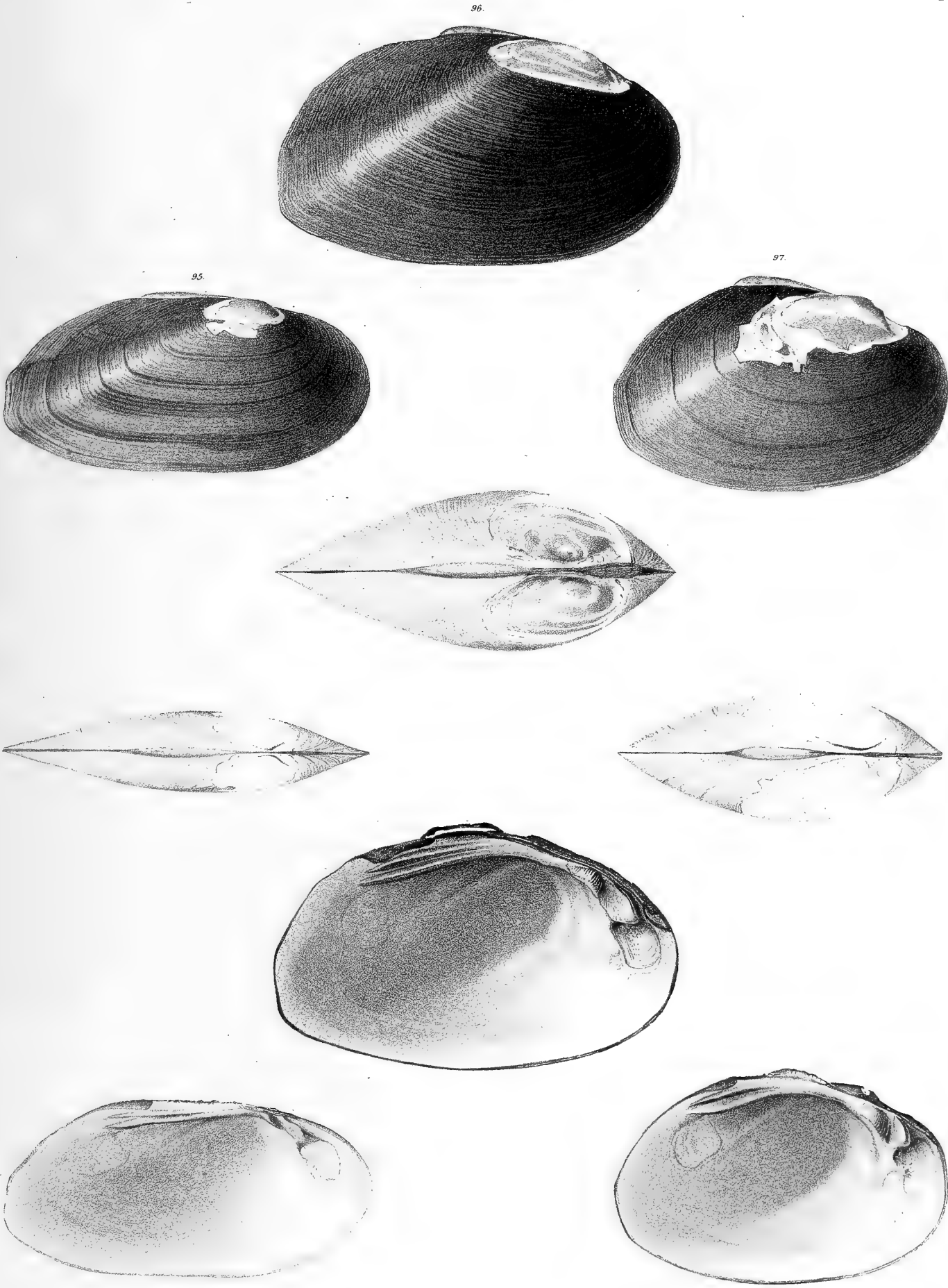
86. *Unio modestus*
 87. *Unio Roswellensis*
 88. *Unio Prattii*
 88 a *Unio Prattii* — soft parts



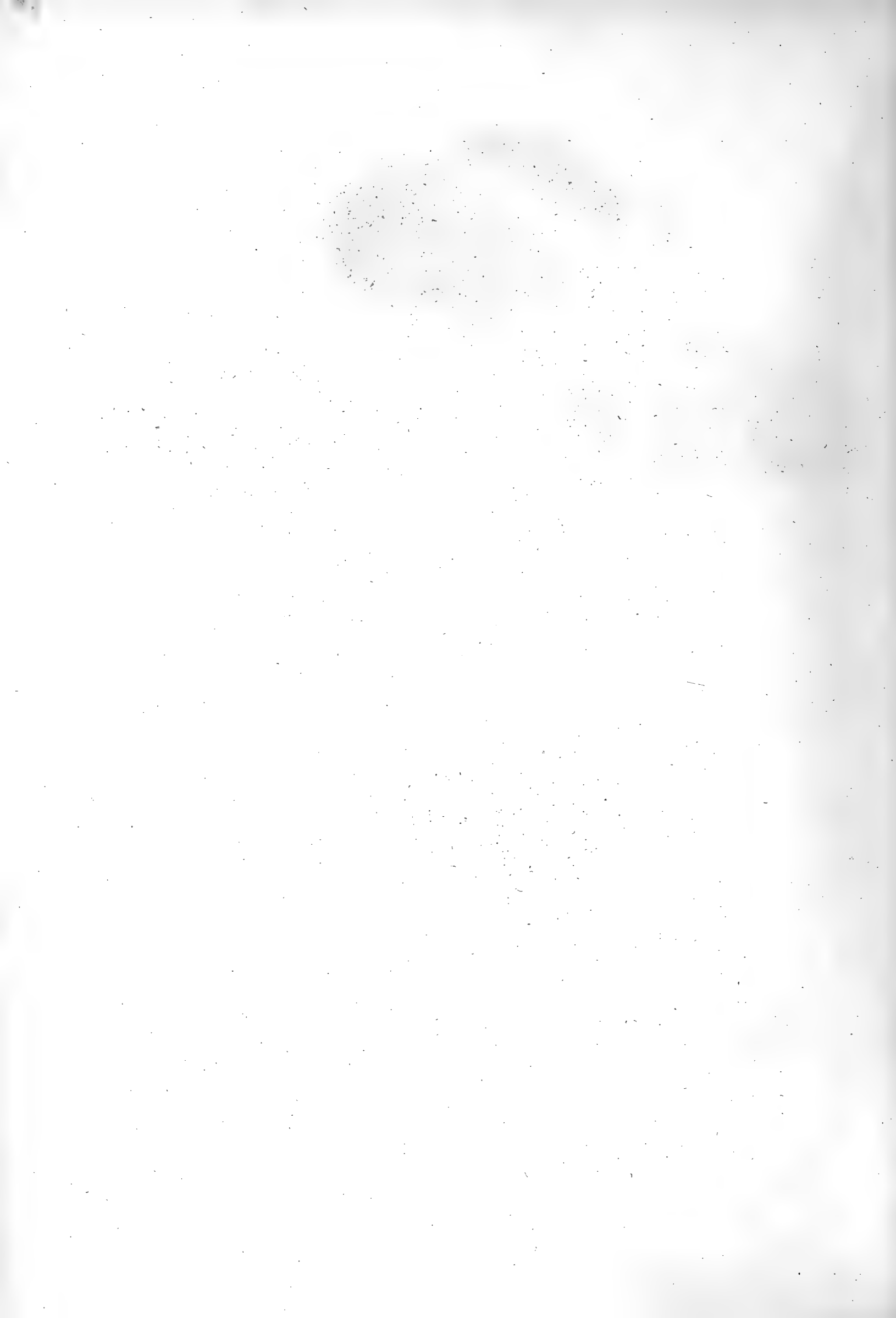
89. *Unio spissus*
90. *Unio Chattanoogaensis*
91. *Unio Downiei*

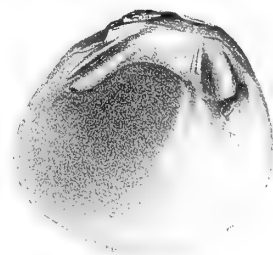
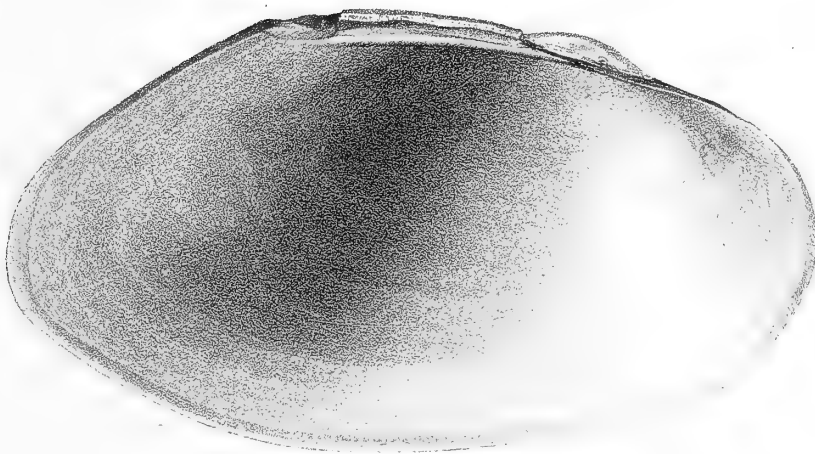
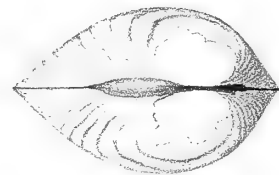
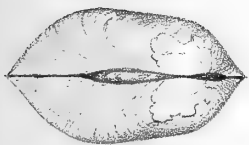
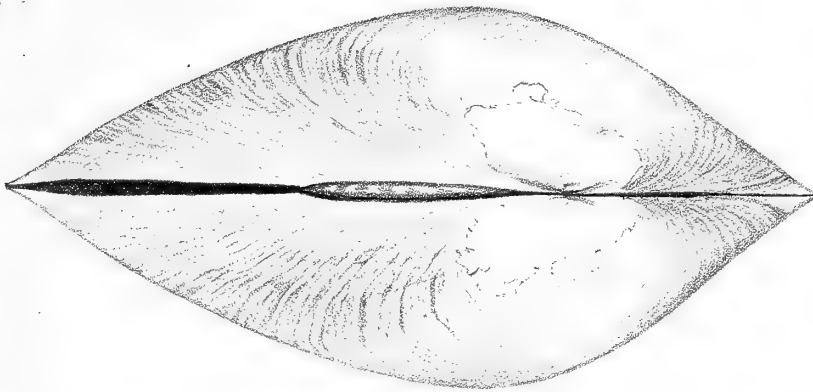
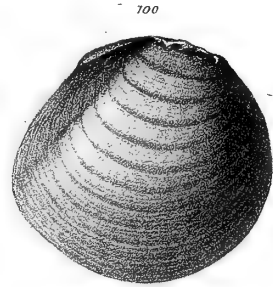
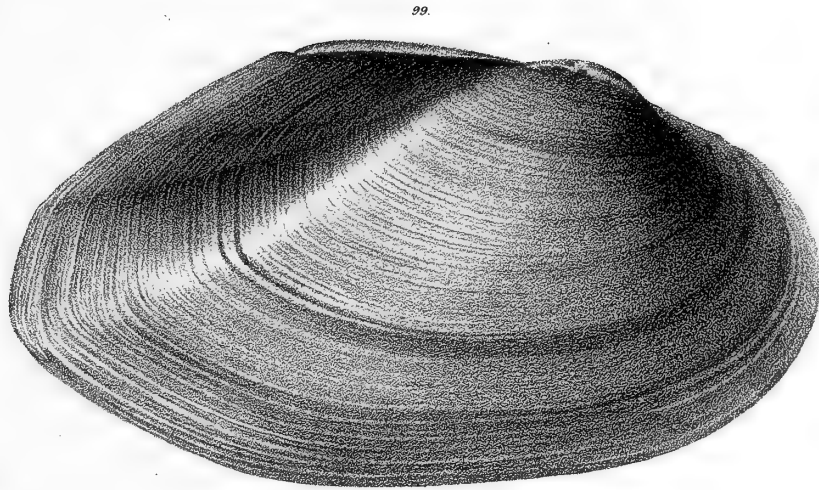


92 *Unio Hazlehurstianus*
93 *Unio Neislerii*
94 *Unio Postelii*



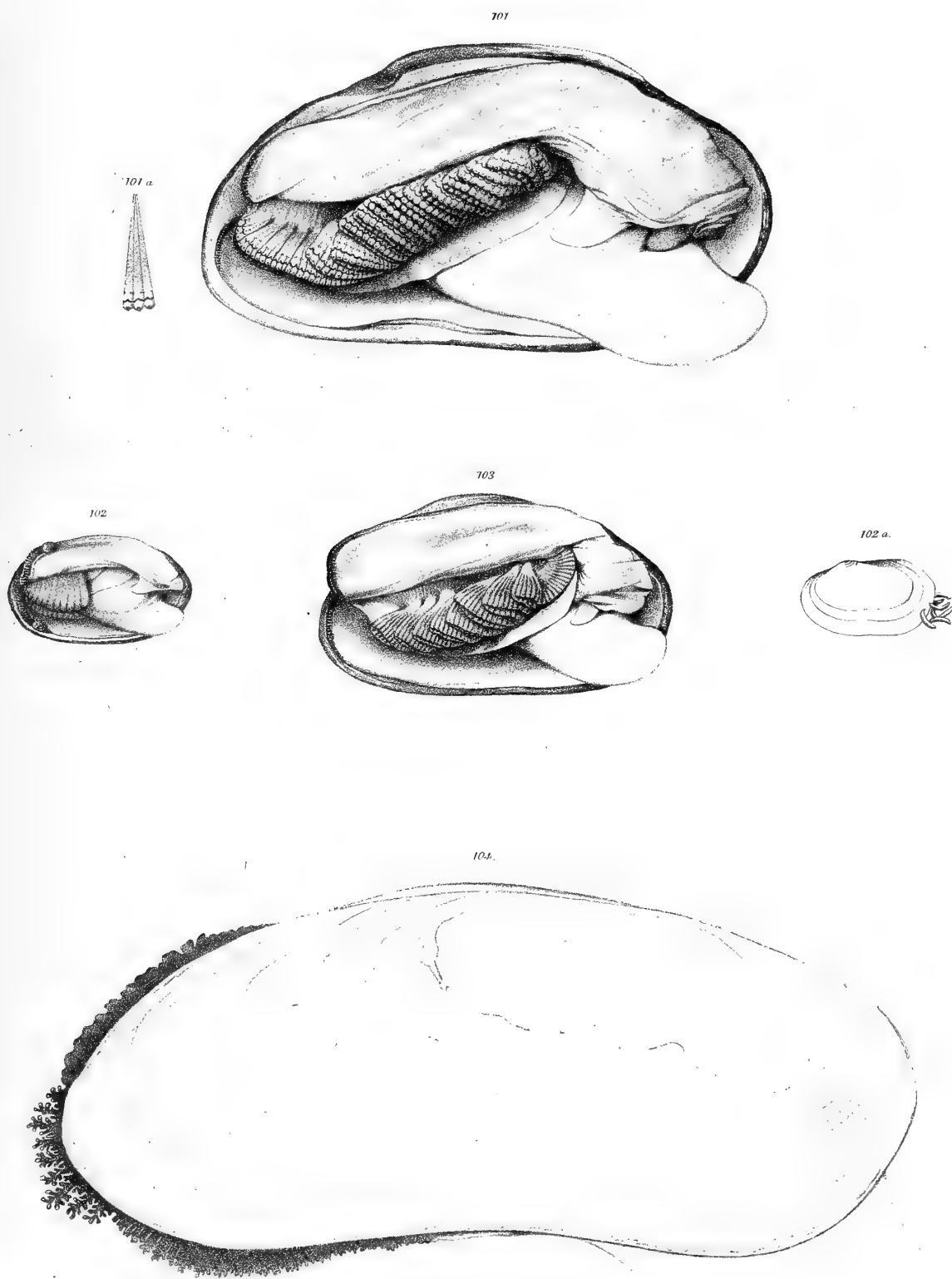
95. *Unio Burkensis*
96. *Unio Satillaensis*
97. *Unio corrugatus*.





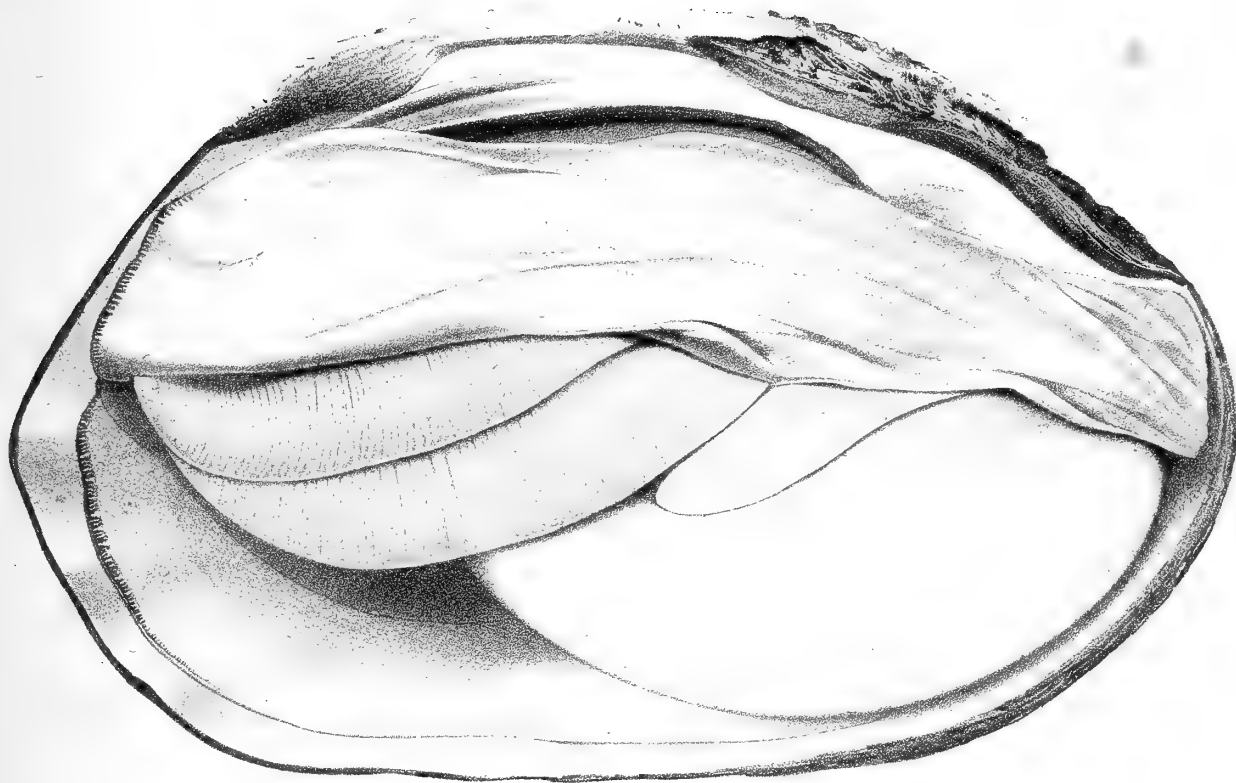
98 *Unio compactus*.
99 *Anodonta dariensis*.
100 *Unio fibuloides*.



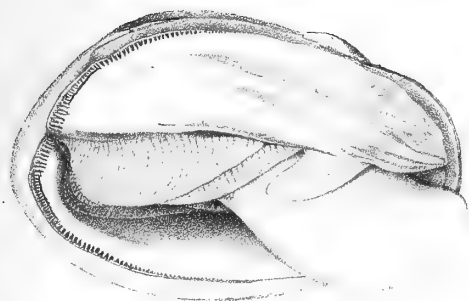


- 101 *Unio phaseolus* Hild
 102 *Unio paryus* Bar
 103 *Unio Woodwardianus* Lea
 104 *Marg margaritifera* Lea

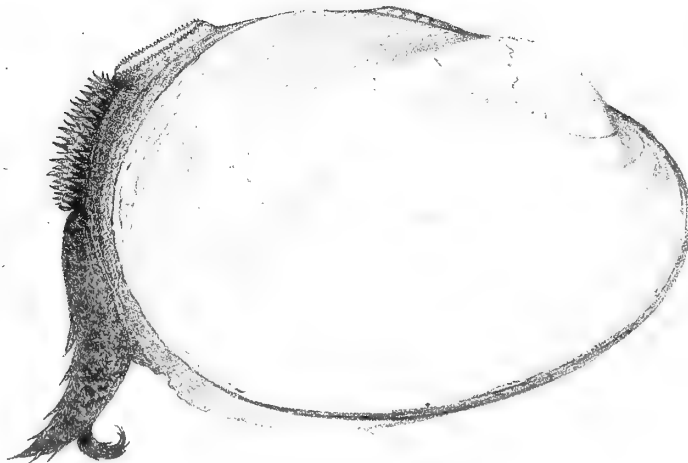
105.



106

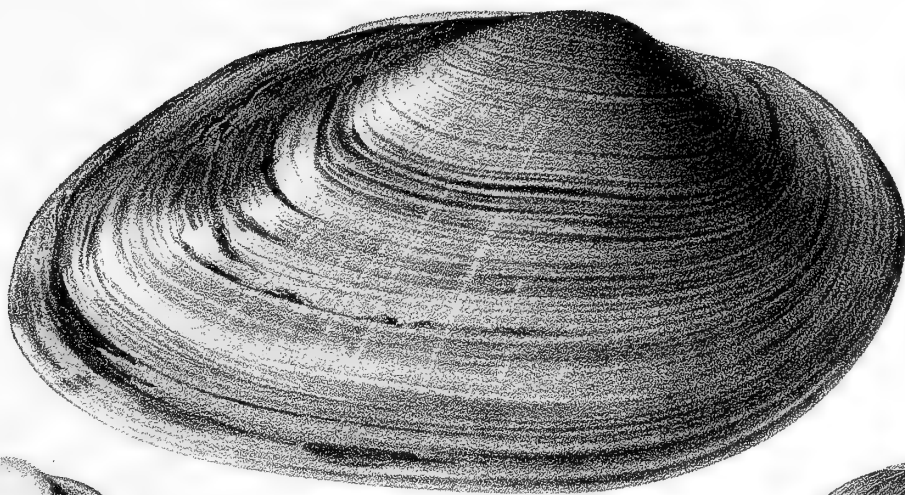


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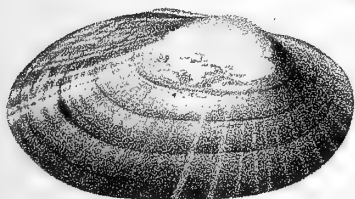


- 105 *Unio multiplicatus* Lea
106 *Unio stramineus* Con.
107 *Unio ventricosus* Bar.

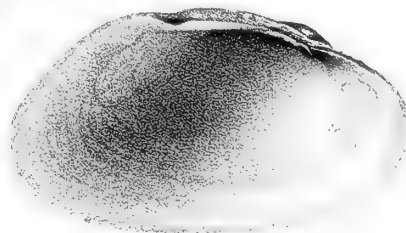
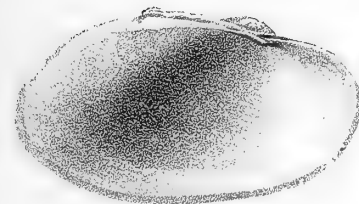
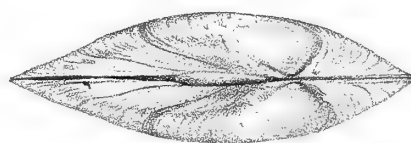
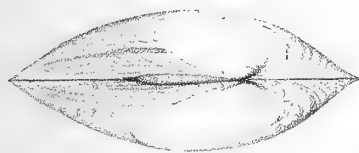
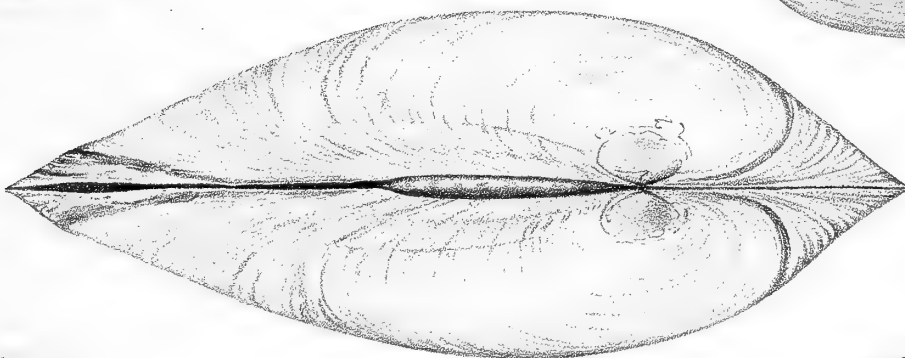
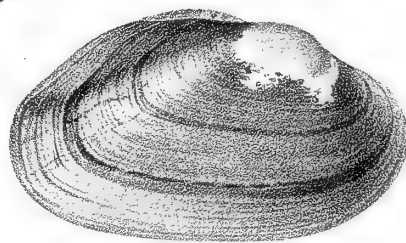
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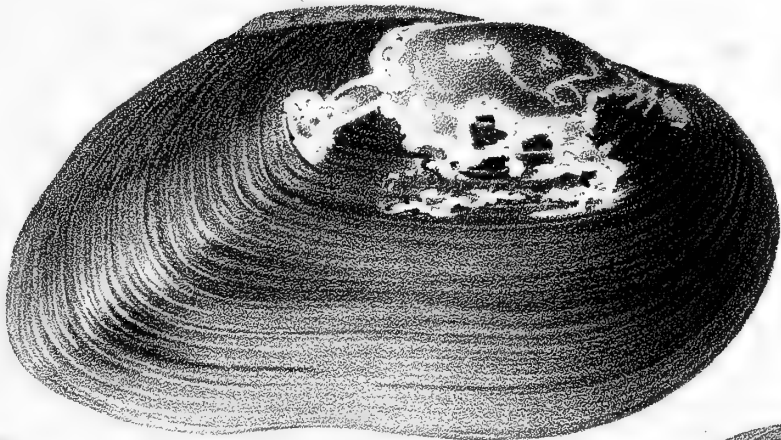
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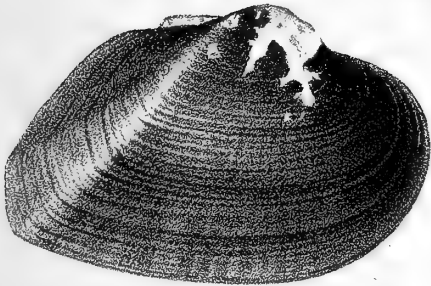
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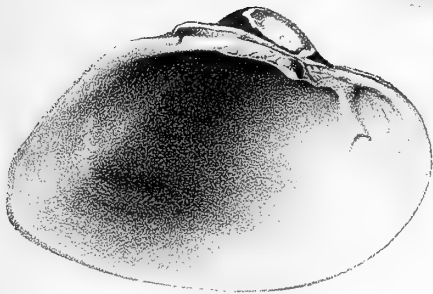
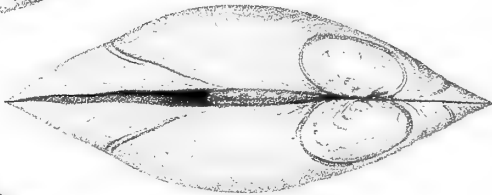
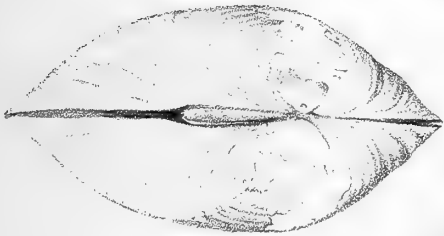
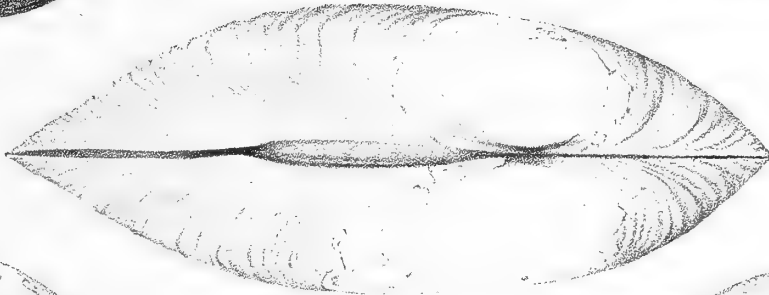
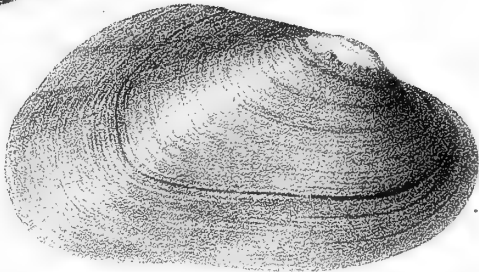
- 108 *Margaritana Elliotti*.
109 *Anodonta Gesnerii*
110 *Margaritana Etowahensis*.



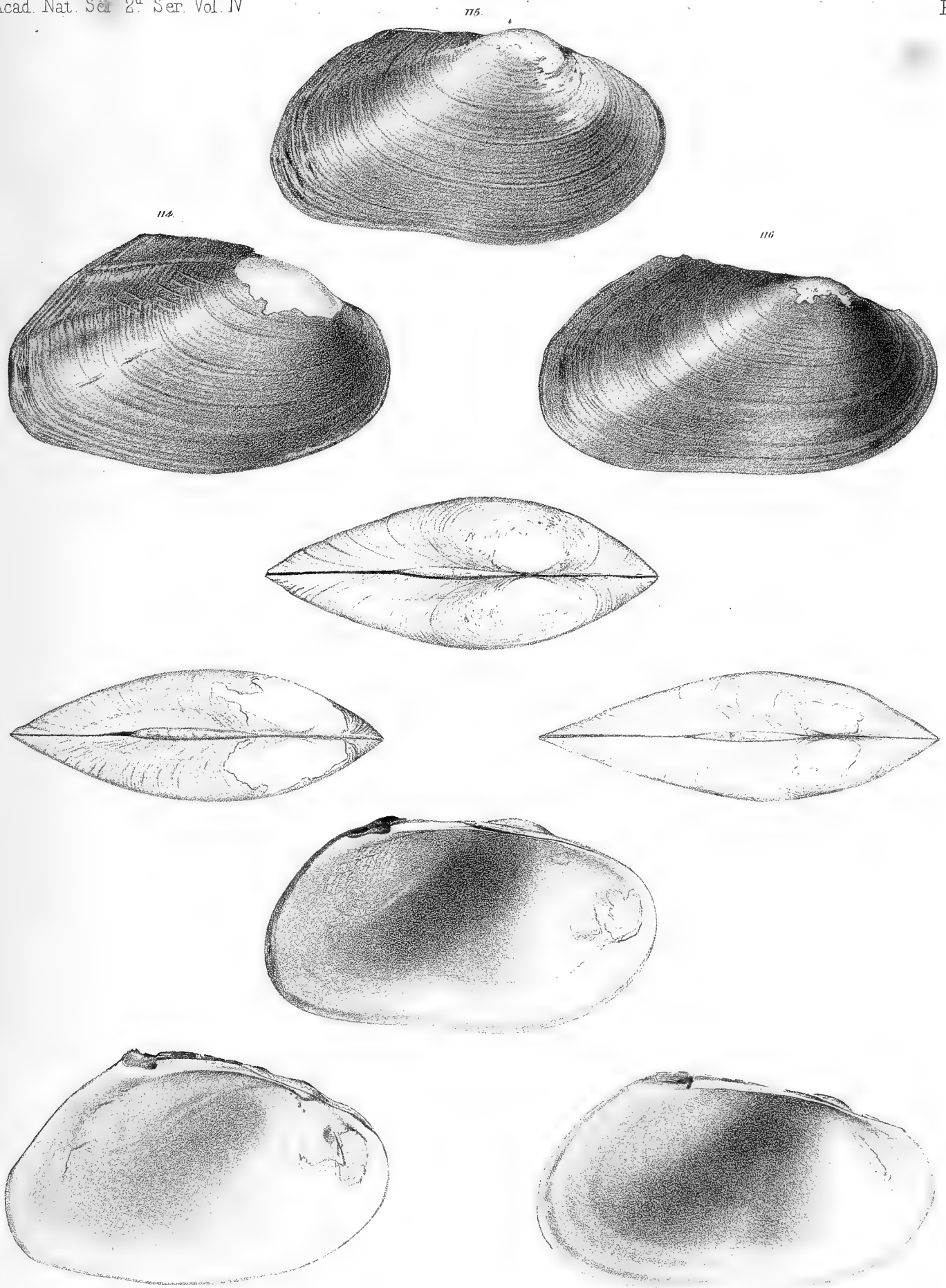
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113

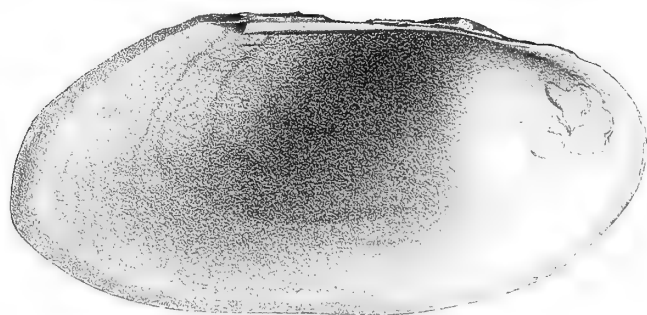
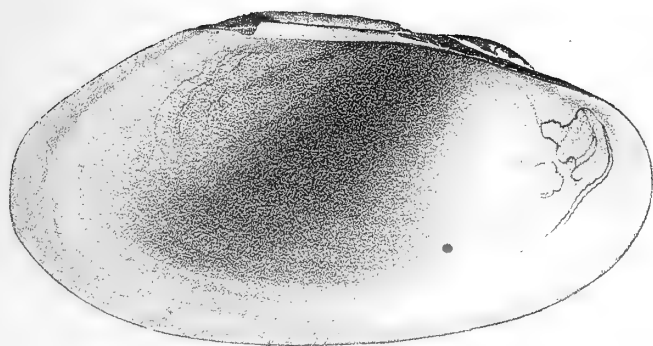
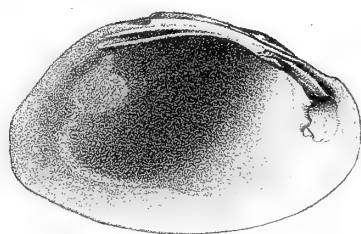
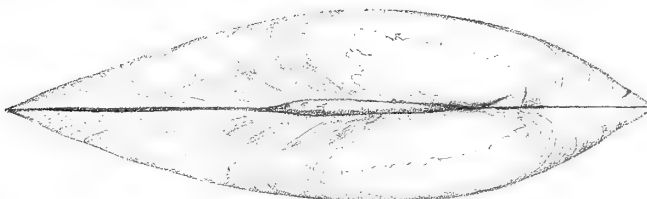
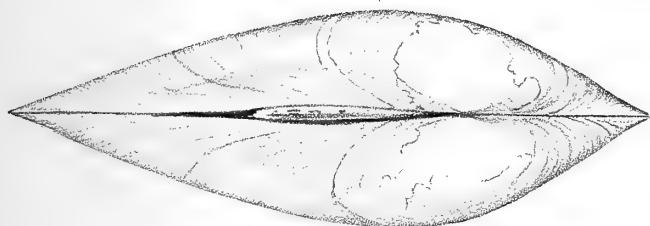
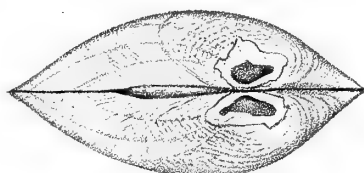
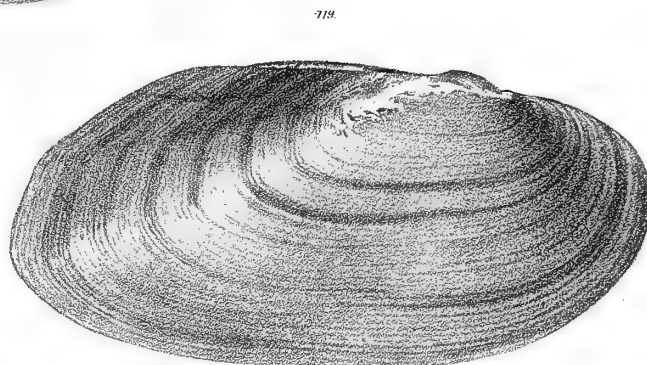
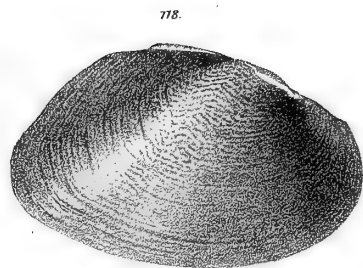


111. *Margaritana triangulata*
112. *Anodonta Hallenbeckii*
113. *Margaritana Connasaugaensis*



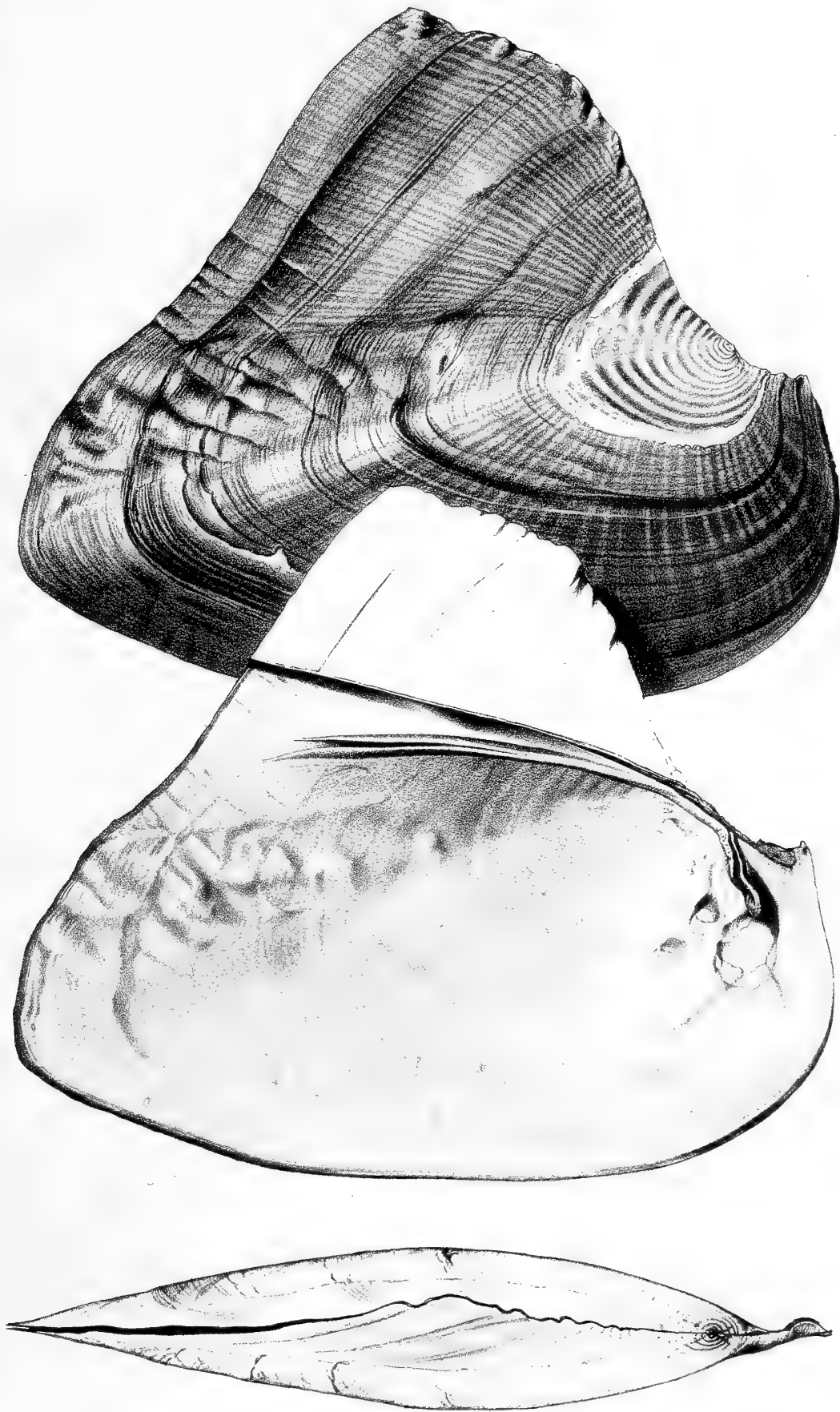
114. *Monocondylaea Cumingii*
115. *Anodonta suberassa*
116. *Anodonta tenuis*.





- 117 *Anodonta crepera*
118 *Uvula sumatrensis*
119 *Anodonta gracilis*

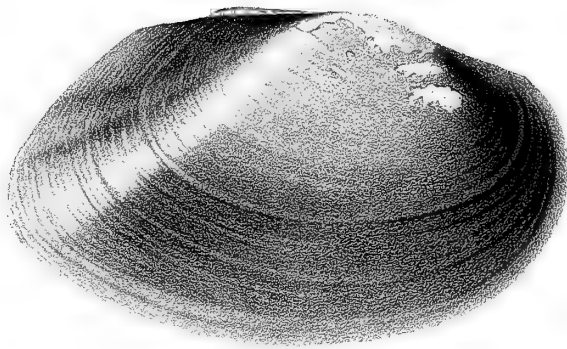
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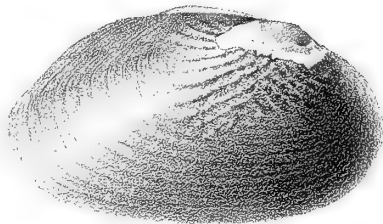
120 *Unio Cumingii*

T. Sinclair's lith. Philad.

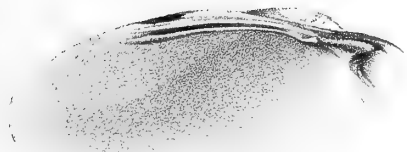
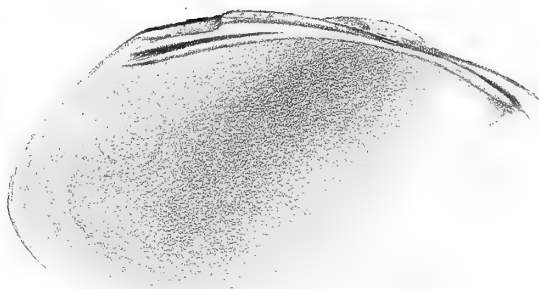
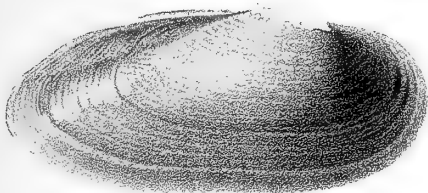
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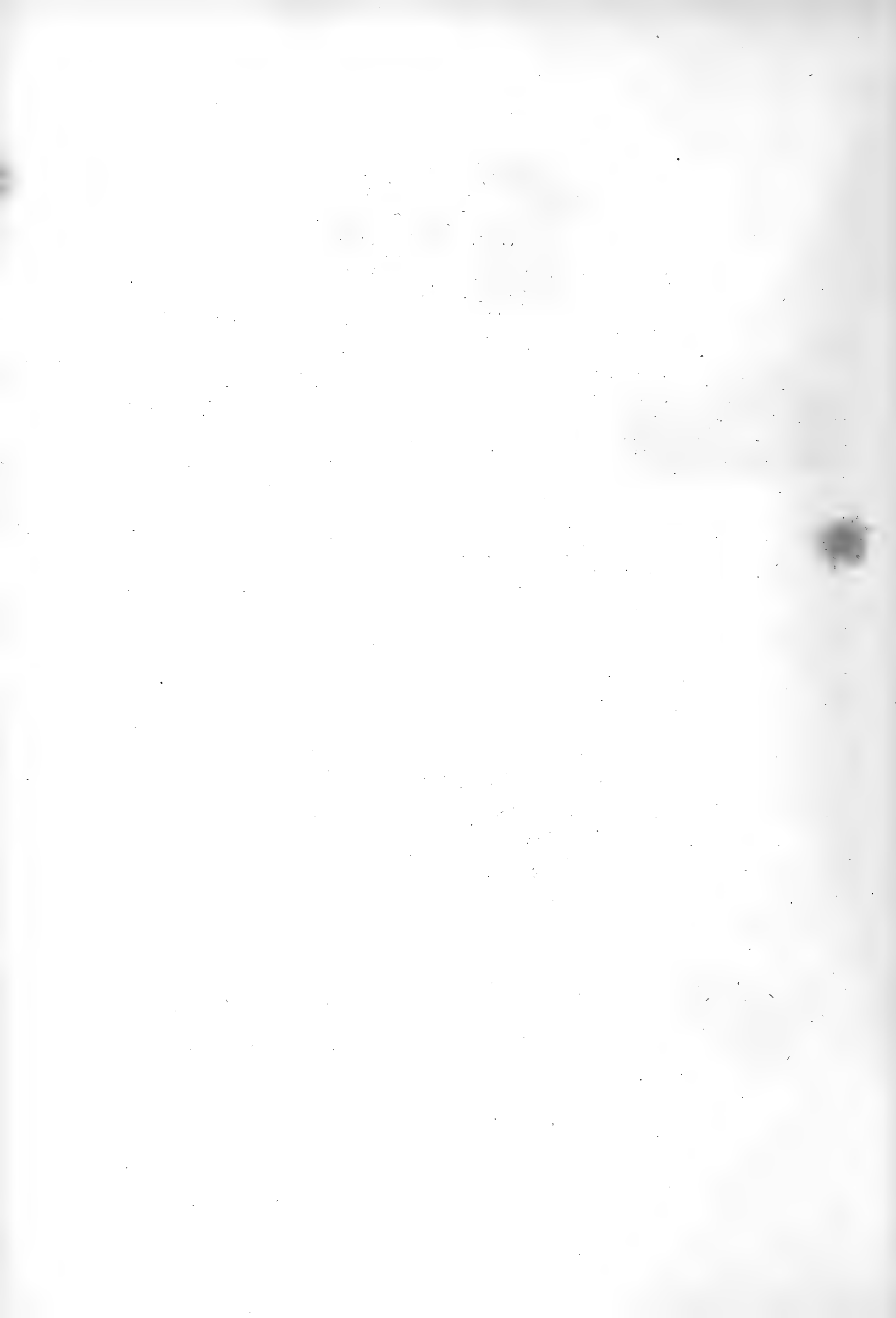
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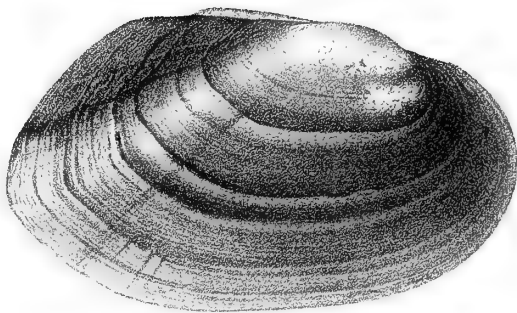
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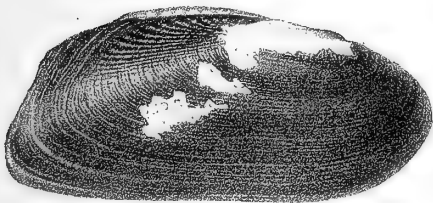
121. *Unio Shanghaiensis*.
122. *Unio Layardi*
123. *Unio Japonensis*



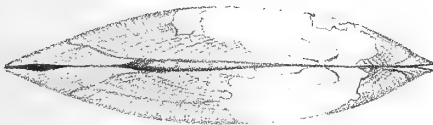
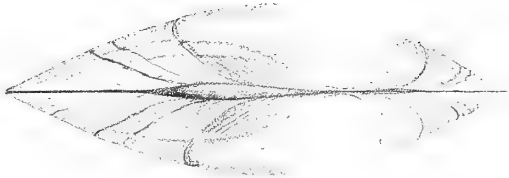
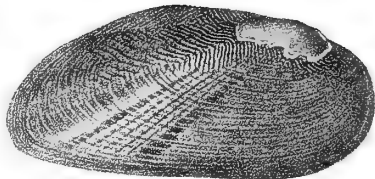
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124

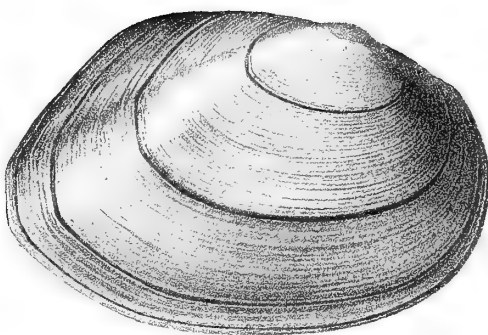


126

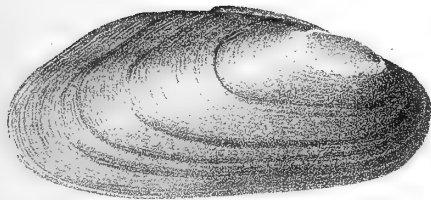


124 *Unio naviguliformis*.
125 *Unio Thwaitesii*.
126 *Unio plicatulus*

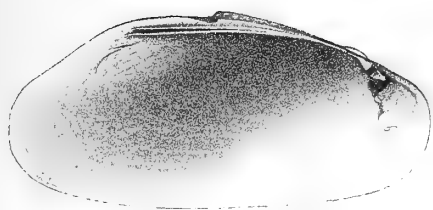
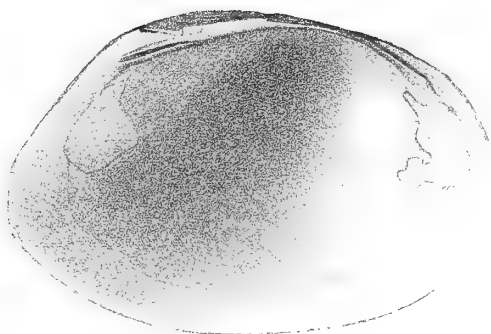
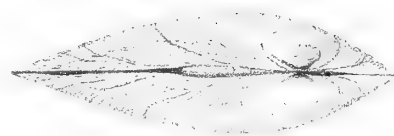
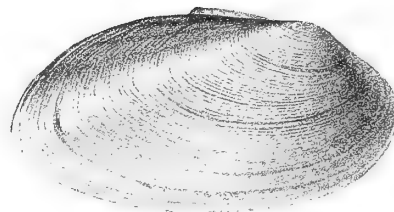
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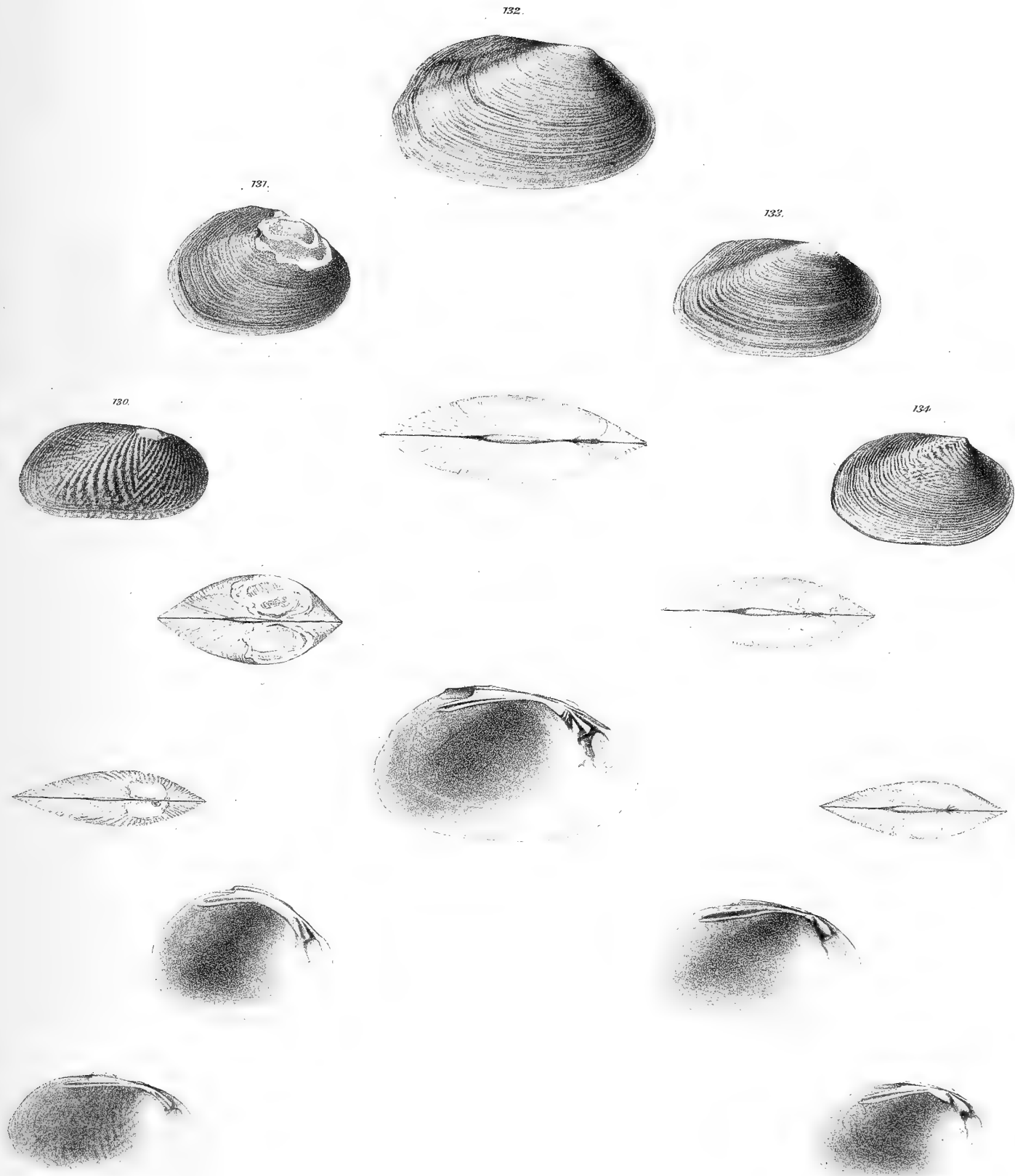
127



129

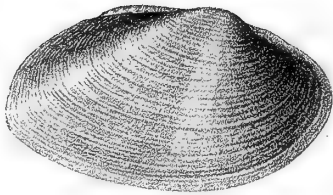


- 127 *Unio mutabilis*
128 *Unio vittatus*
129 *Unio melleus*

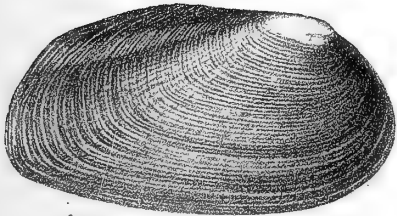


130. *Unio fluctiger*
131. *Unio Sikkimensis*
132. *Unio Dysonii*
133. *Unio Demeraraensis*
134. *Unio dimidiatus*

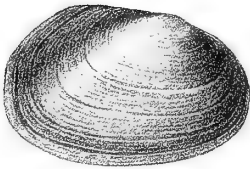
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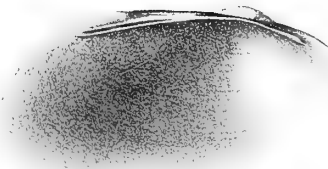
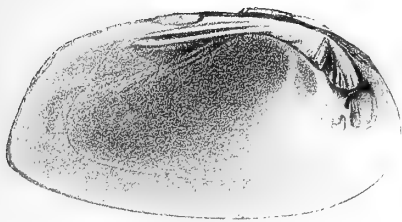
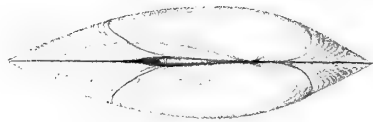
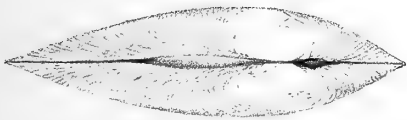
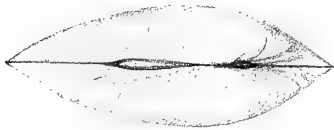
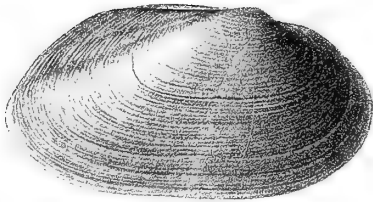
135.



138.



137.

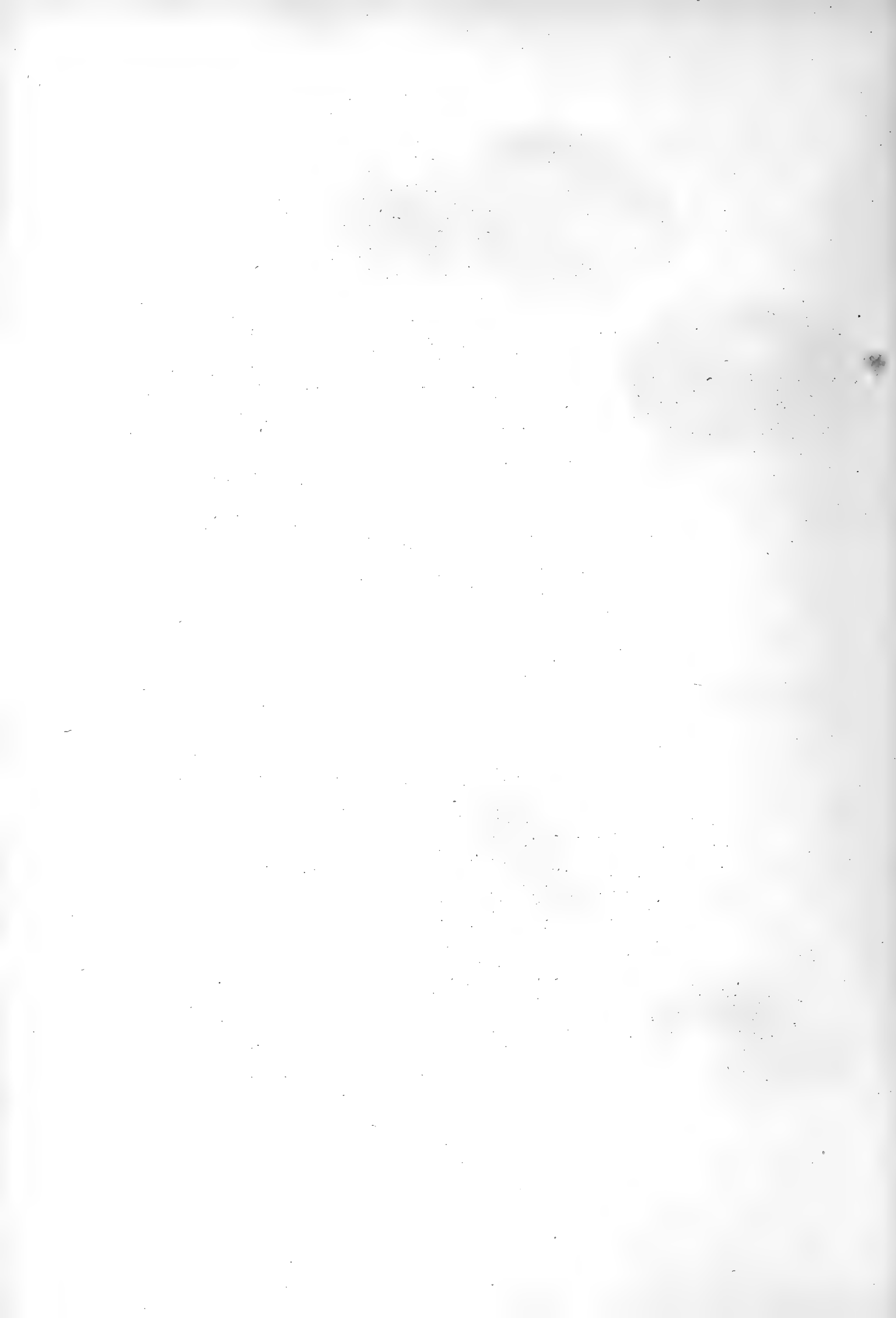


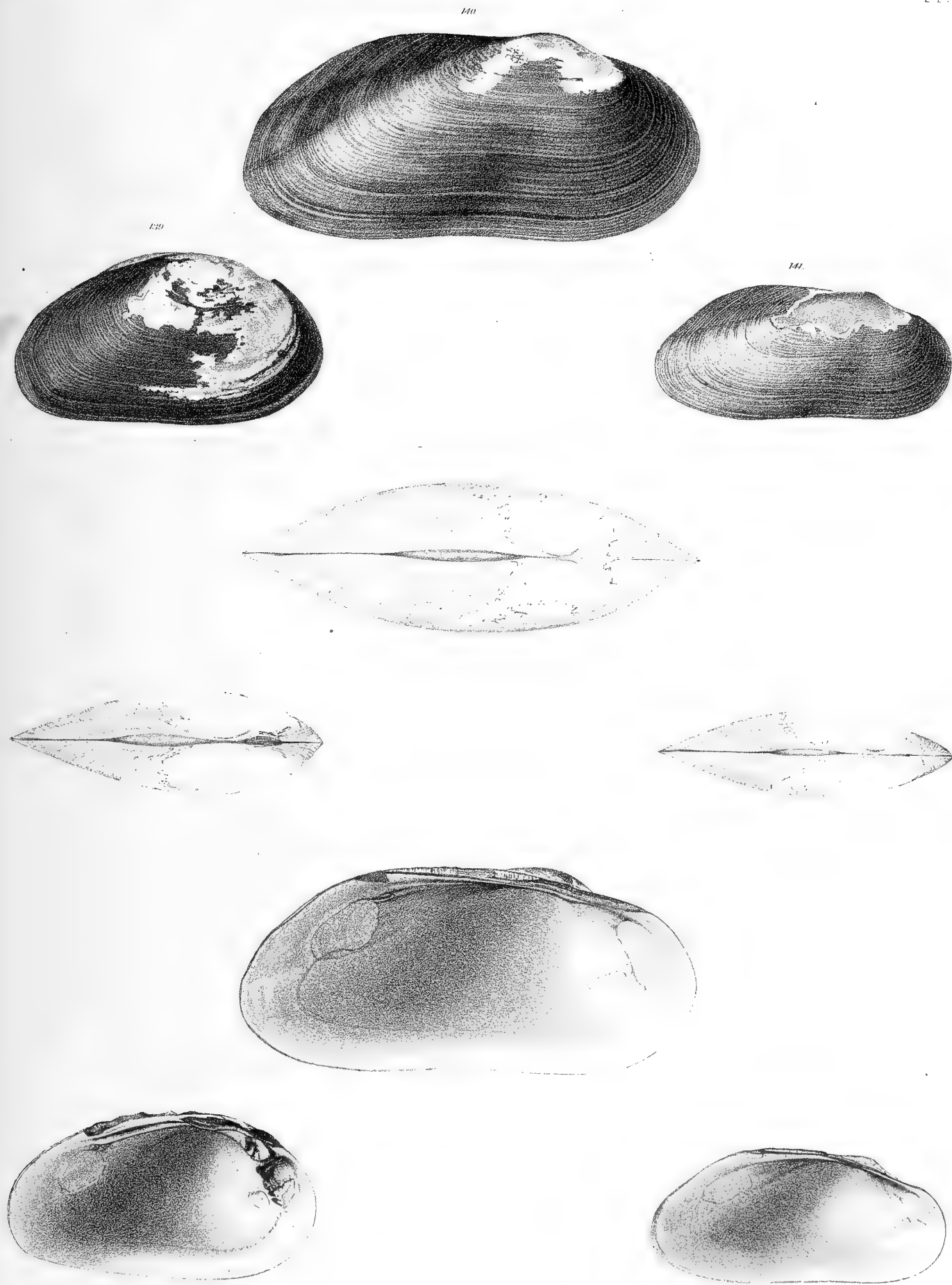
135 *Unio persulcatus*

136 *Unio Rowellii*

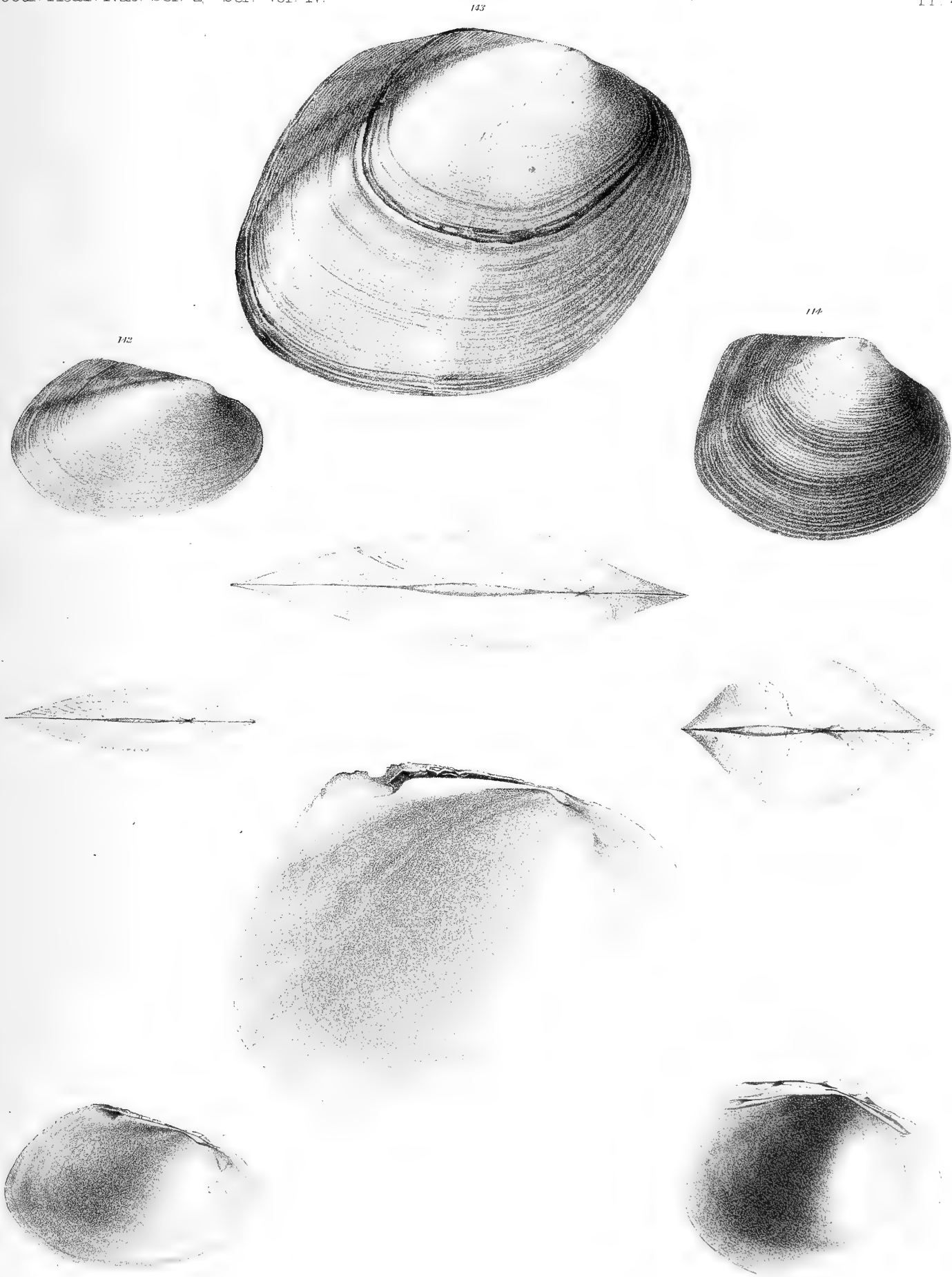
137 *Unio Wilsonii*

138 *Unio Mauritanus*

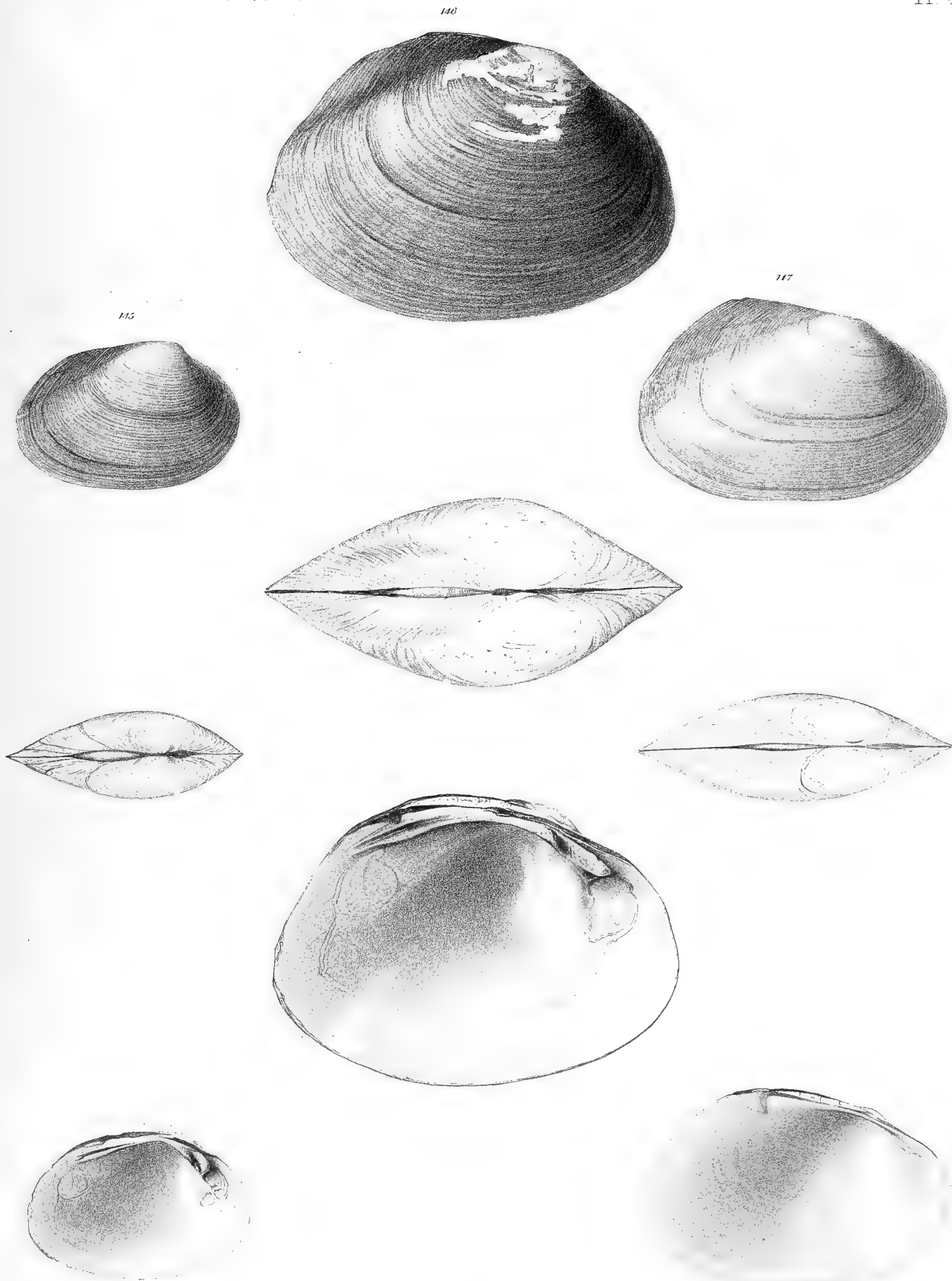




139. *Unio Goascoranensis*.
140. *Anodonta Senegalensis*.
141. *Anodonta Dahomeyensis*

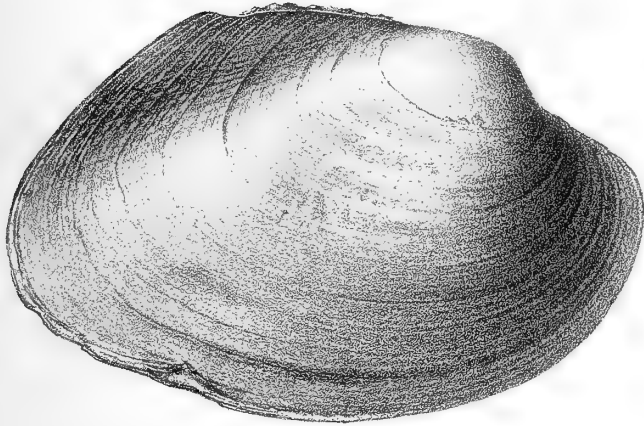


142 *Monocondylea planulata*.
143 *Monocondylea rhomboidea*.
144 *Unio bulloides*.

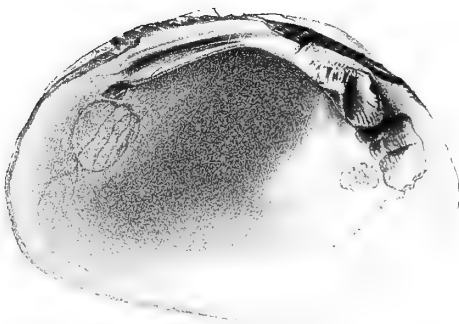
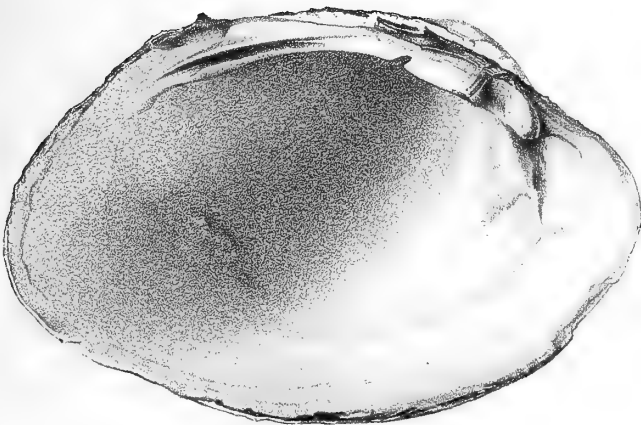
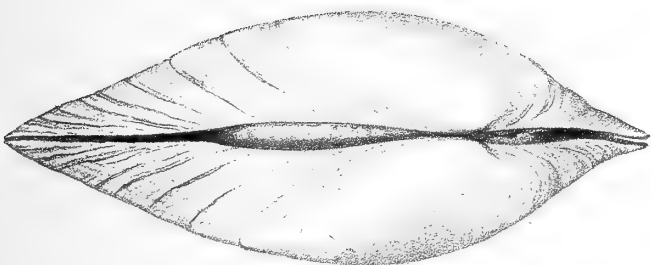
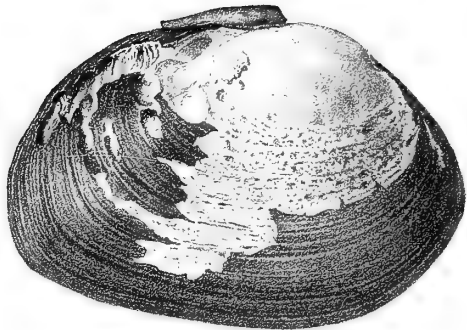


145. *Unio Caldwellii*
146. *Unio rudus*.
147. *Anodonta luteola*

148

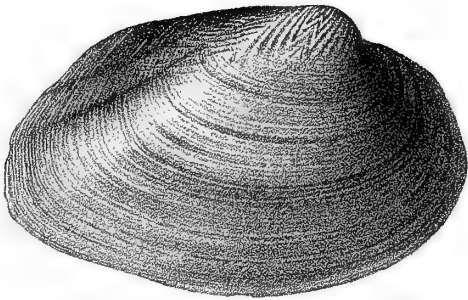


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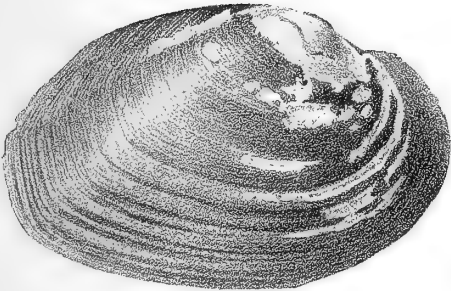


148. *Unio Canadensis*.
149. *Unio Averyi*

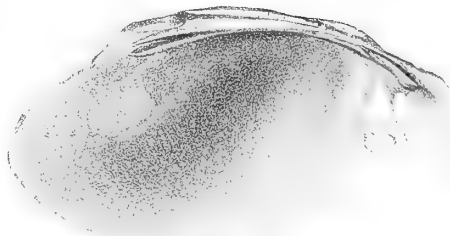
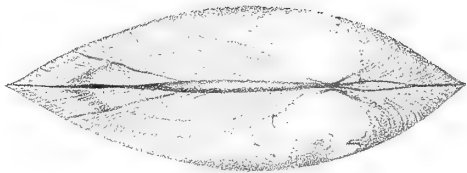
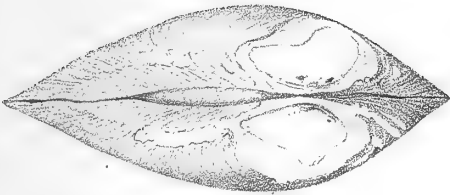
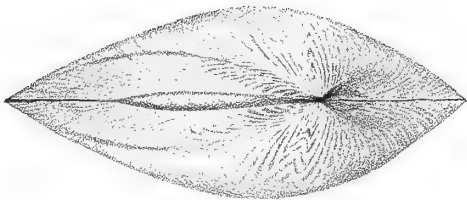
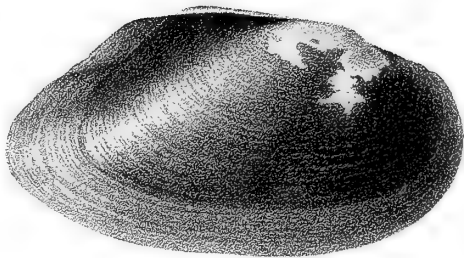
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150.

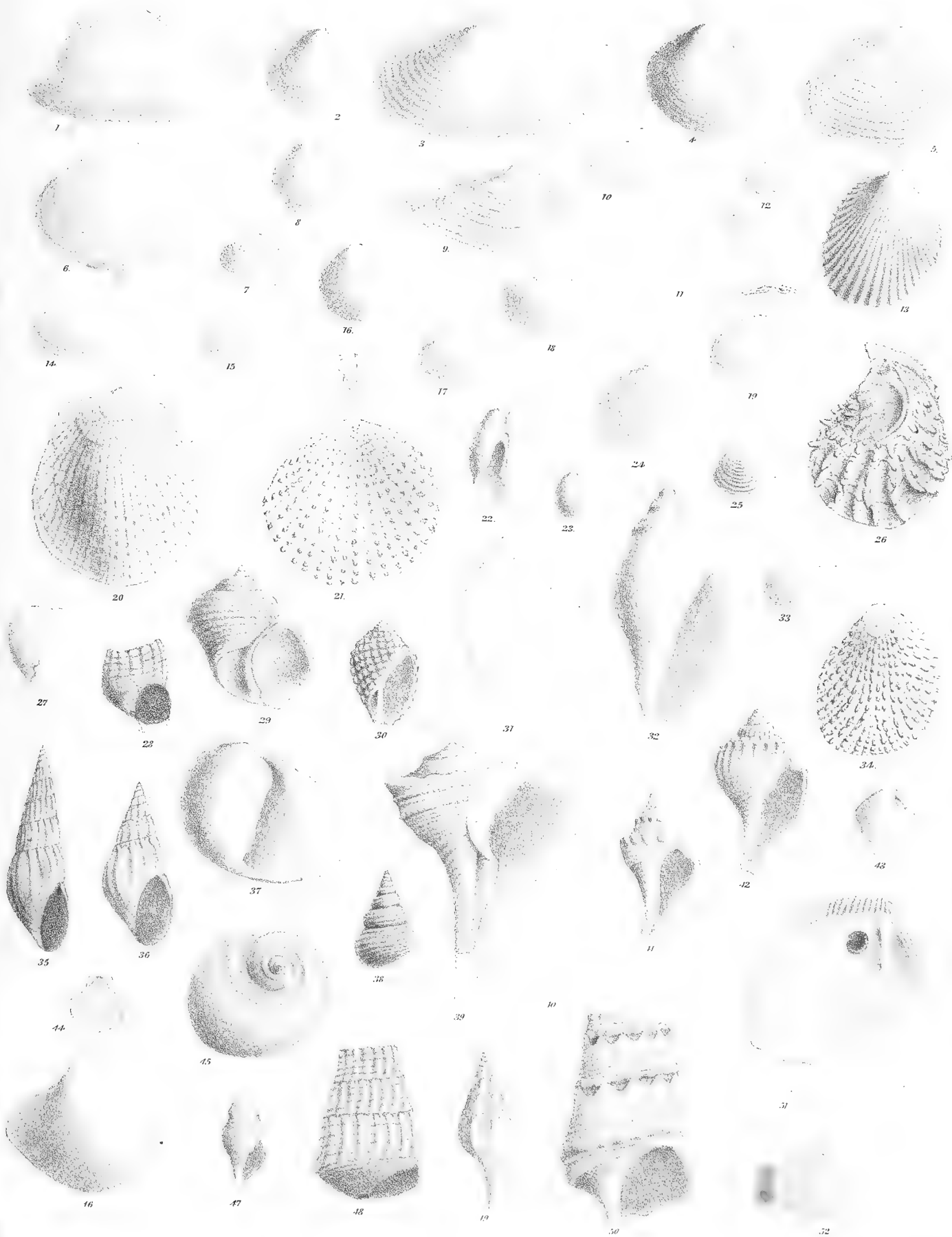


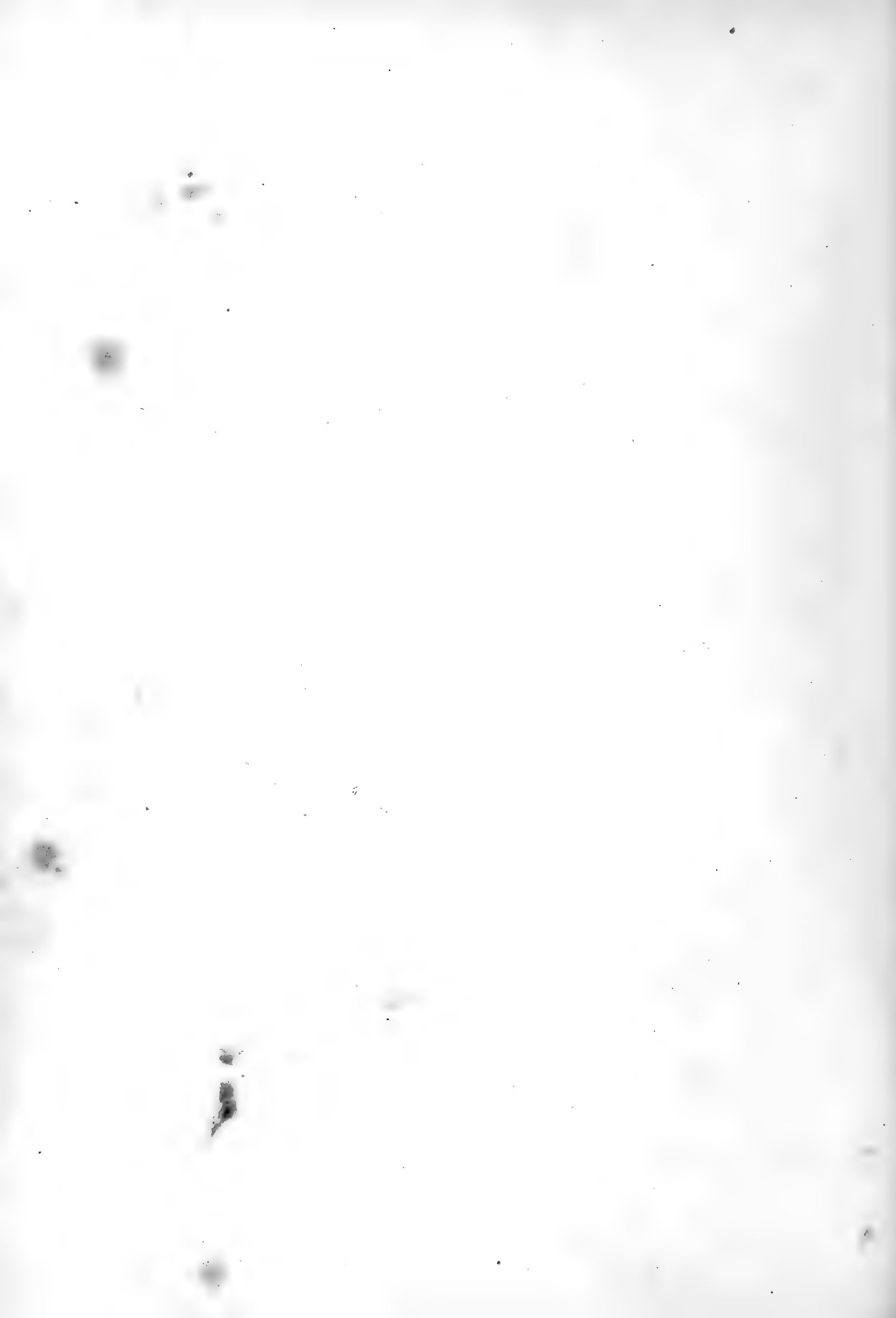
152.

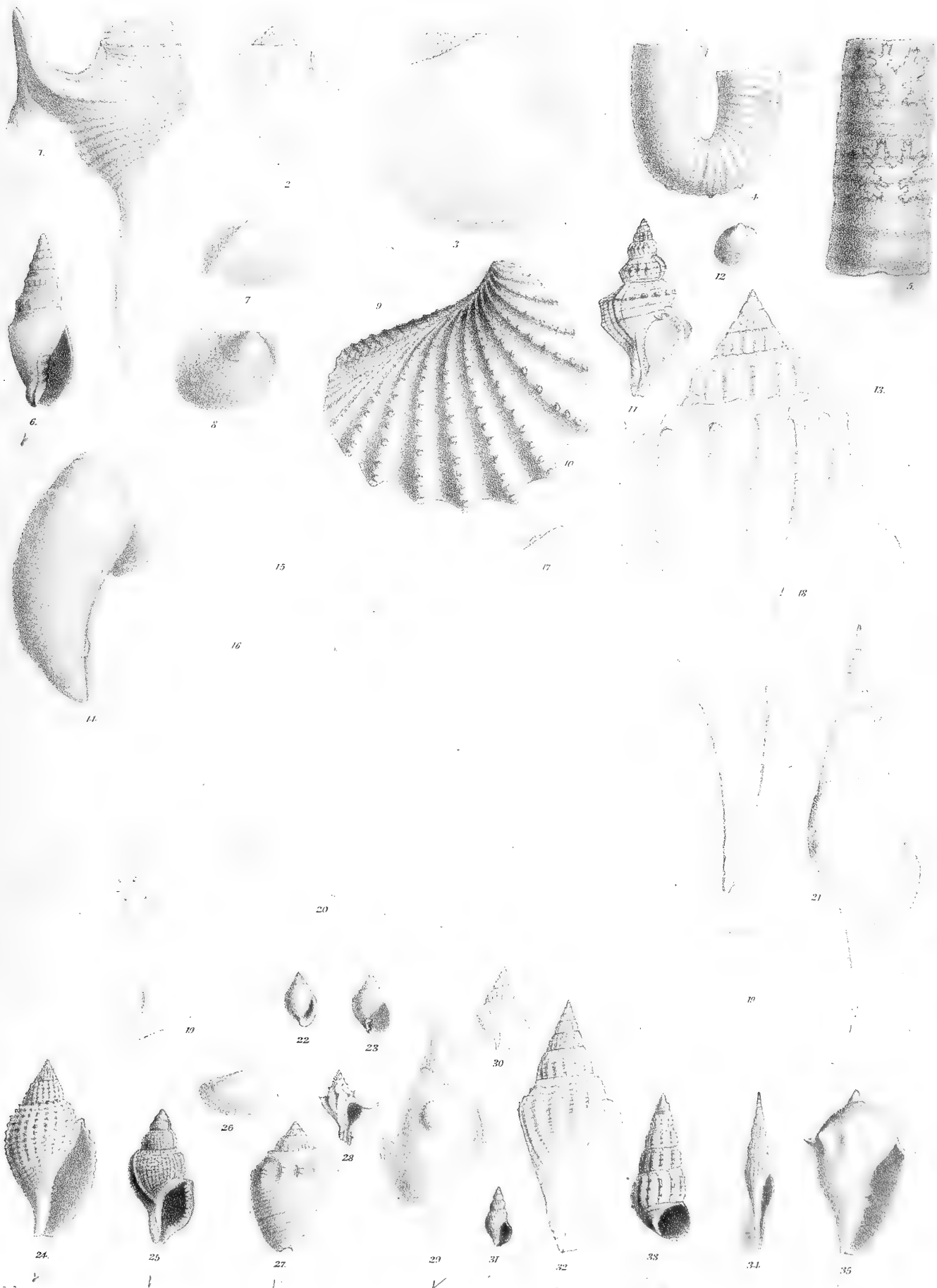


150 *Unio Nagpoorensis*
151 *Unio Wynegungaensis*
152 *Unio consobrinus*



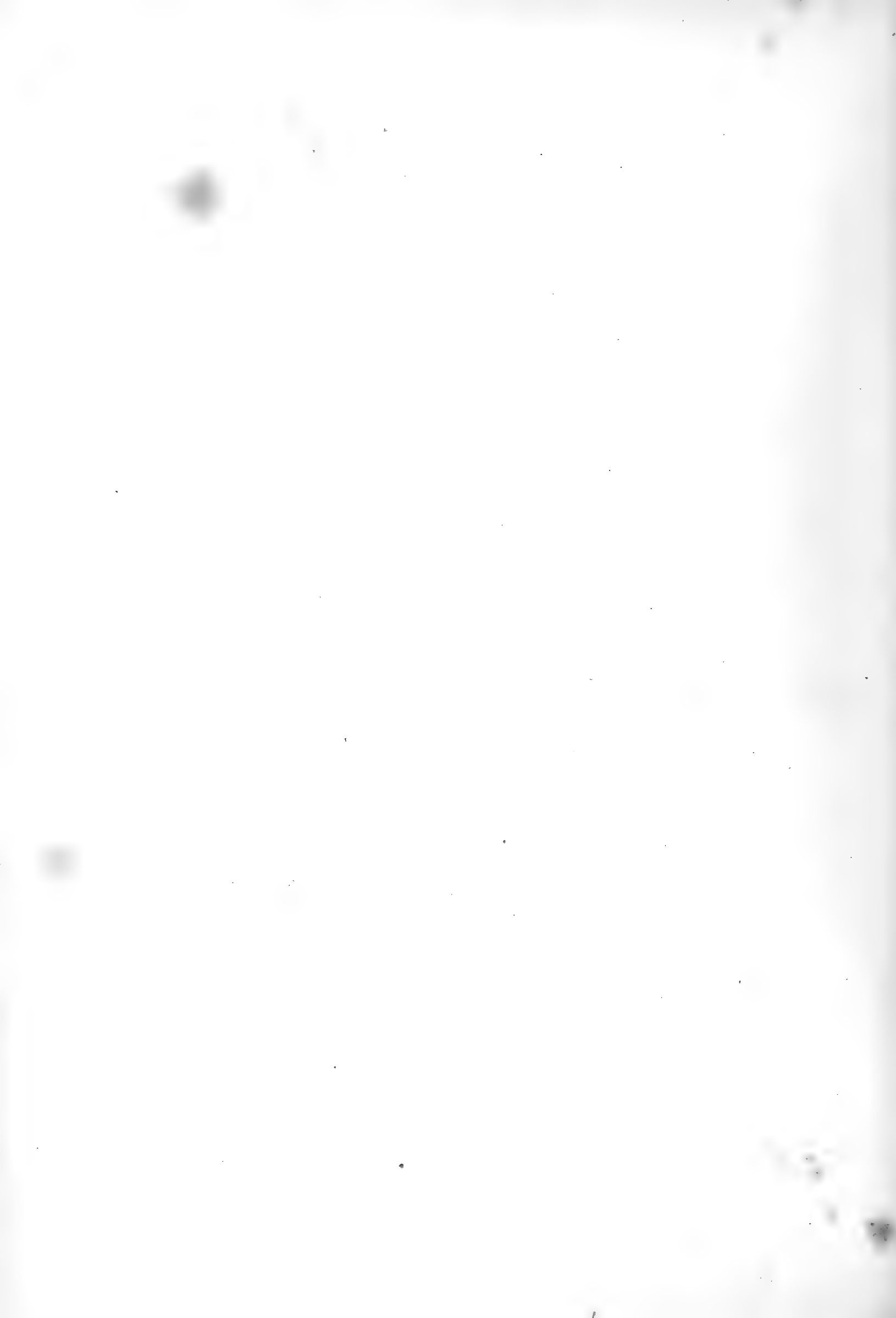


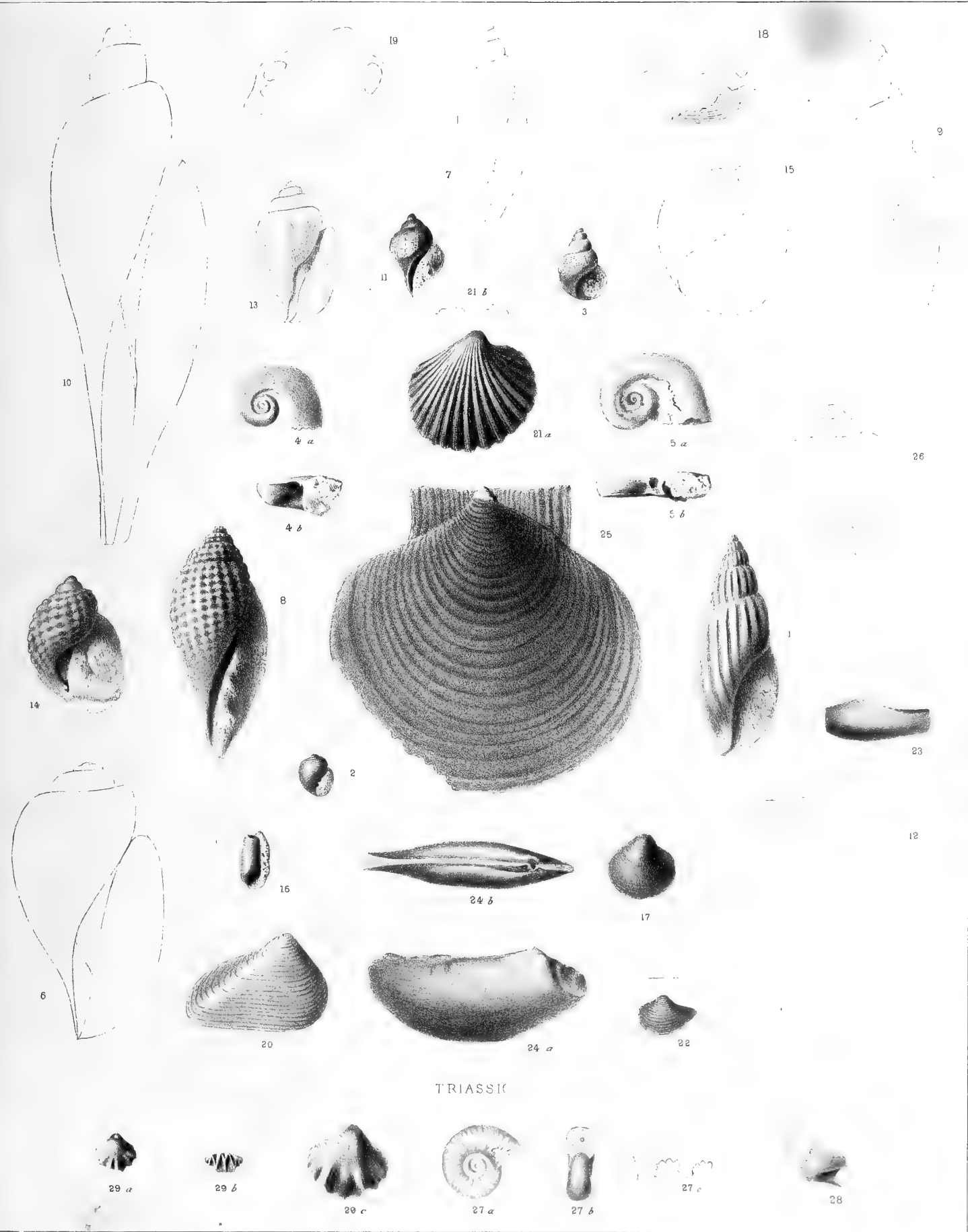




T Conrad, del

T Sinclair's lith. Phila





TRIASSIC

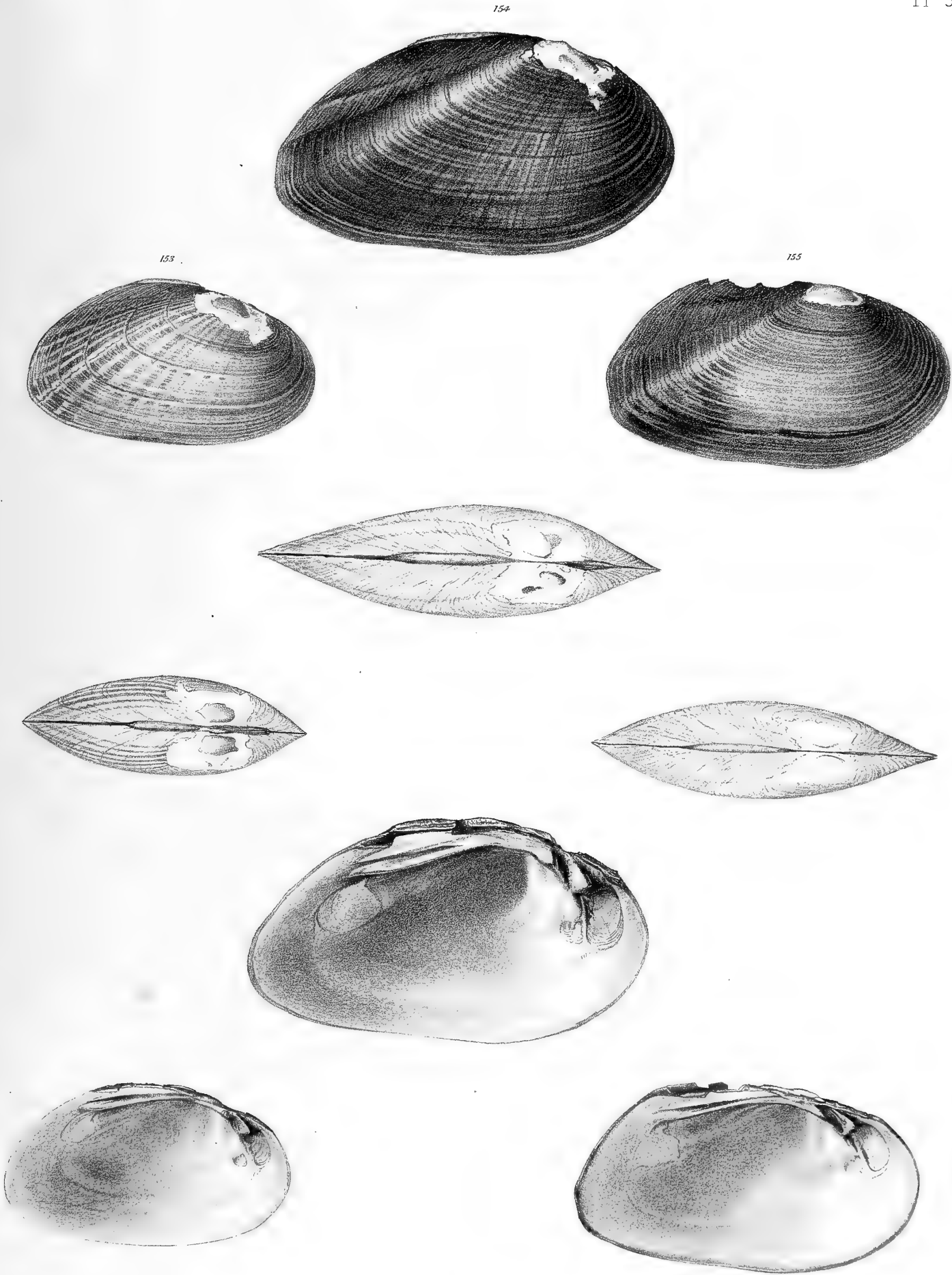


1. MEROPOGON BREWERI. CASSIN.

2. MEROPISCUS MÜLLERI. CASSIN.

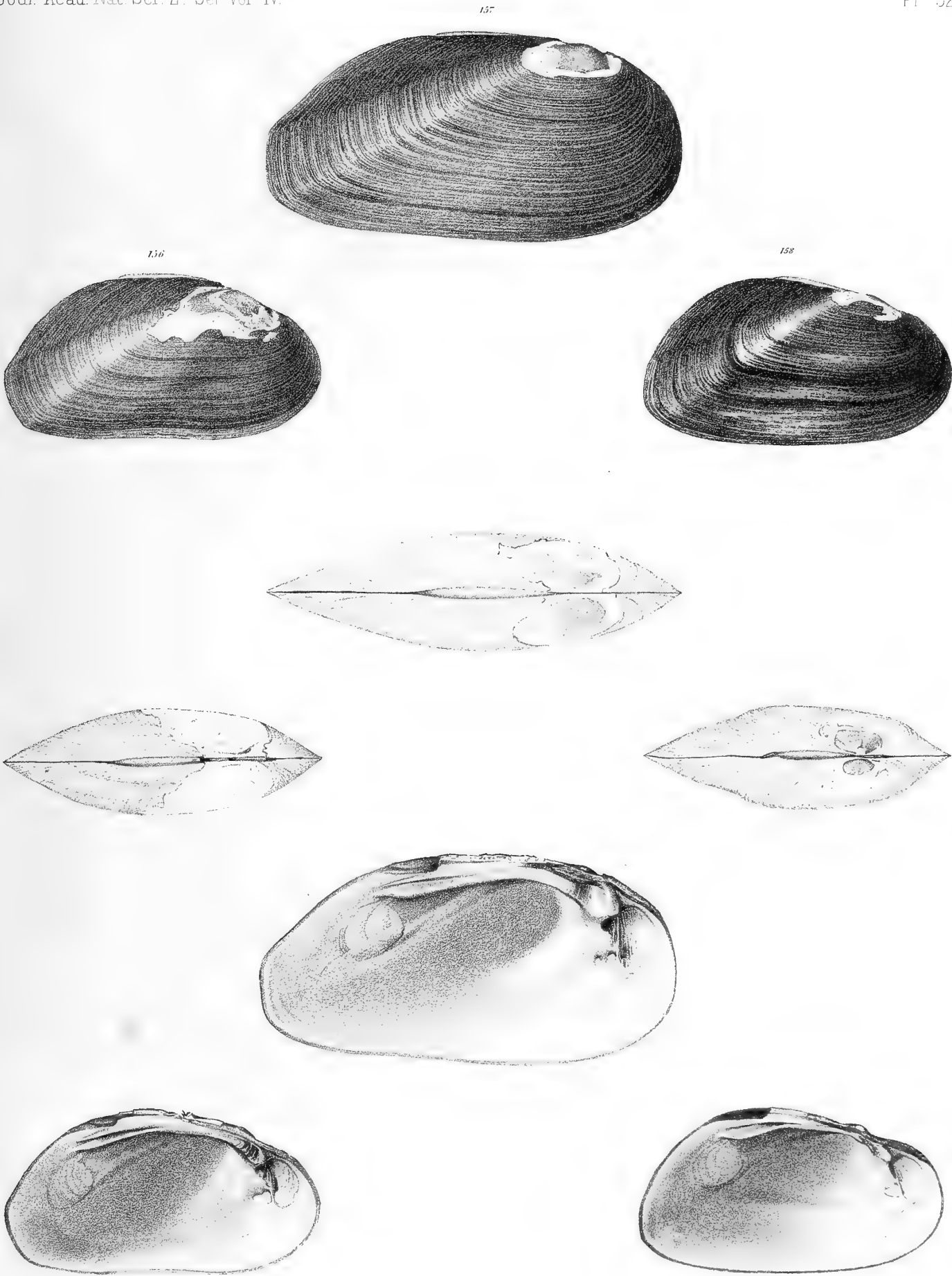


1. 2. MUSCIPETA DUCHAILLUI. CASSIN. ♂ ♀. 3. M. SPECIOSA. CASSIN. ♂.
4. TROCHOCERCUS NITENS. CASSIN. ♂.

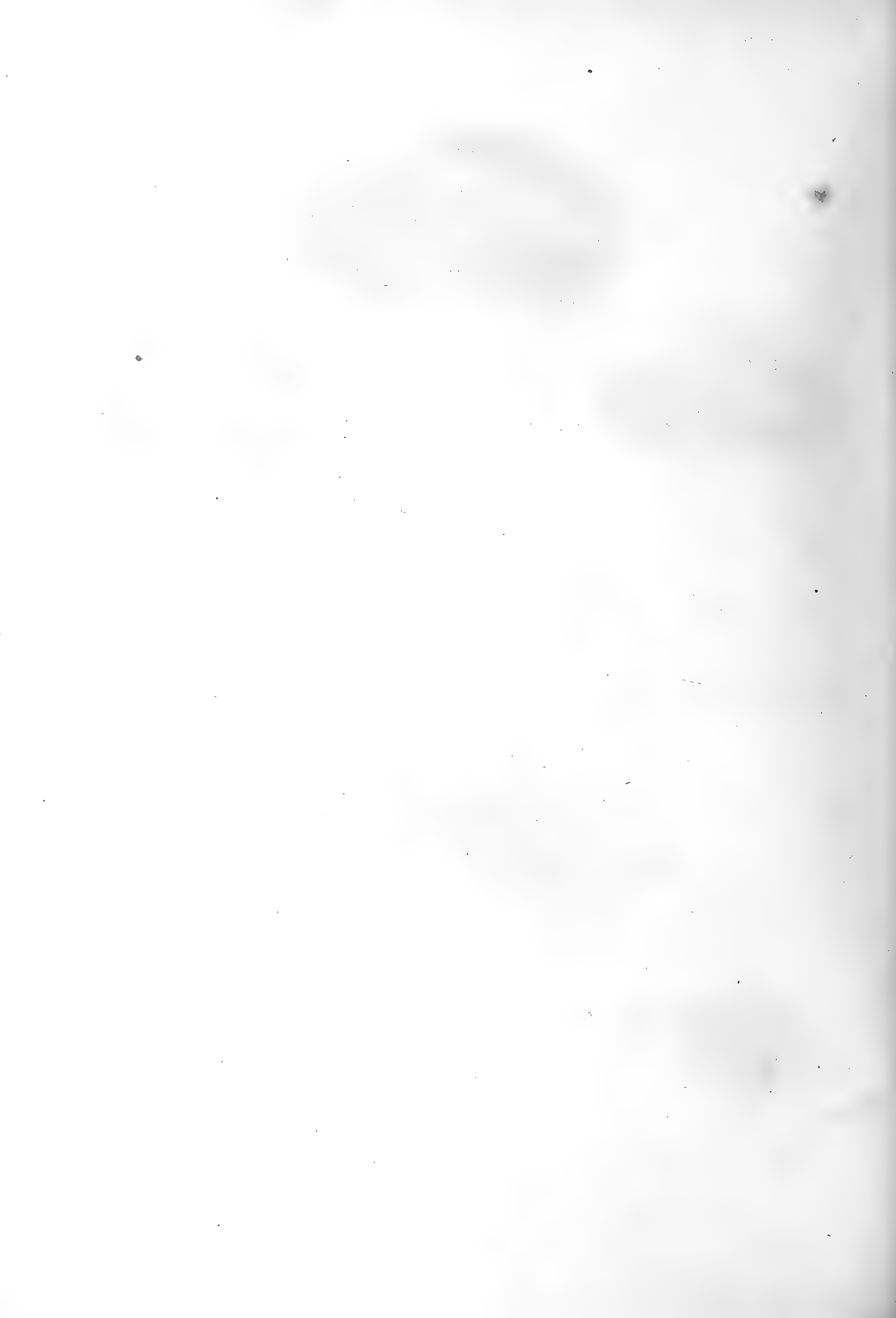


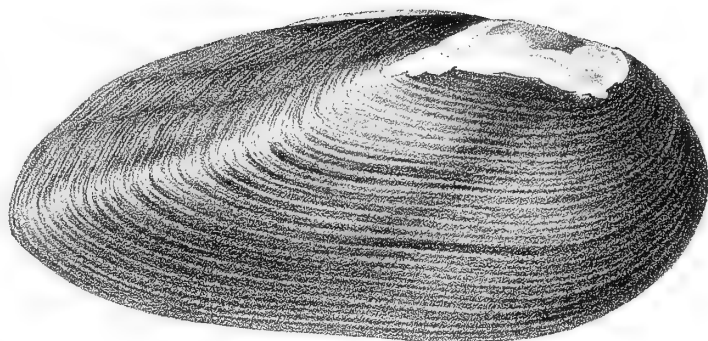
153. *Unio dispar*
154. *Unio Hallenbeckii*.
155. *Unio Baldwinensis*.



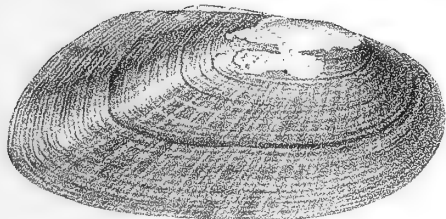


156. *Unio Racensis.*
157. *Unio salebrosus*
158. *Unio inusitatus.*

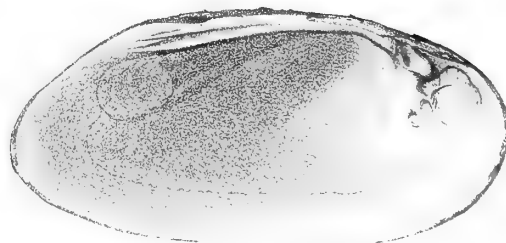
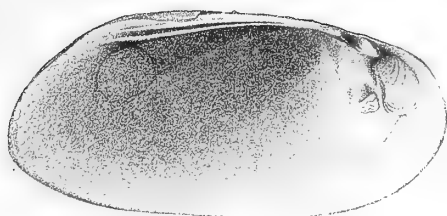
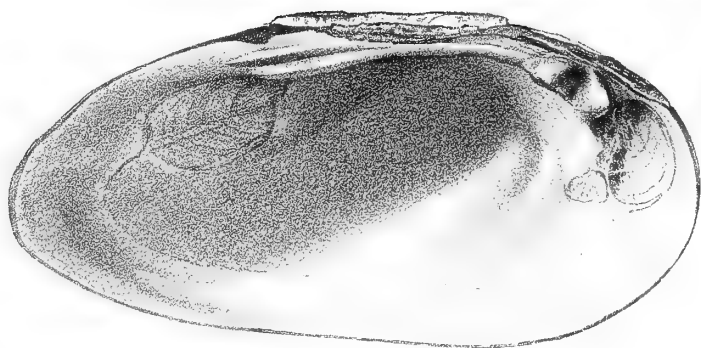
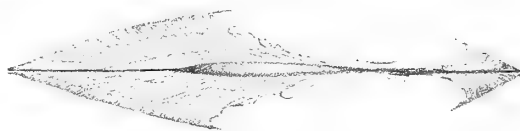
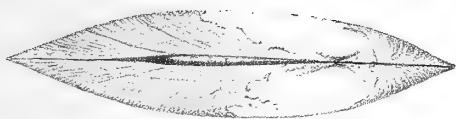
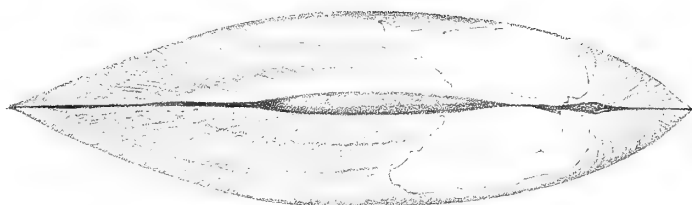
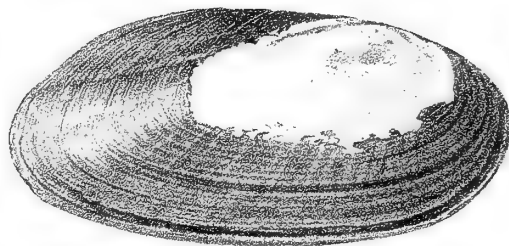




159



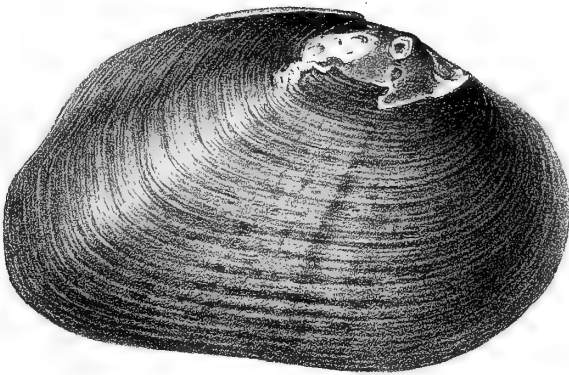
161



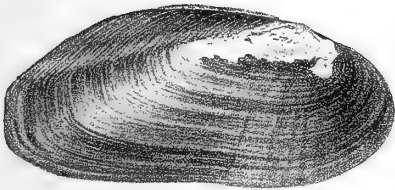
159. *Unio latus*
160. *Unio verubus*
161. *Unio viridiviridatus*



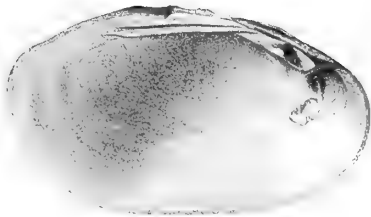
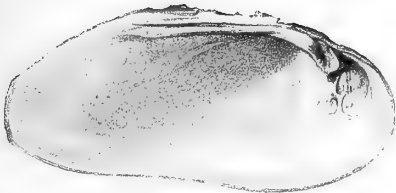
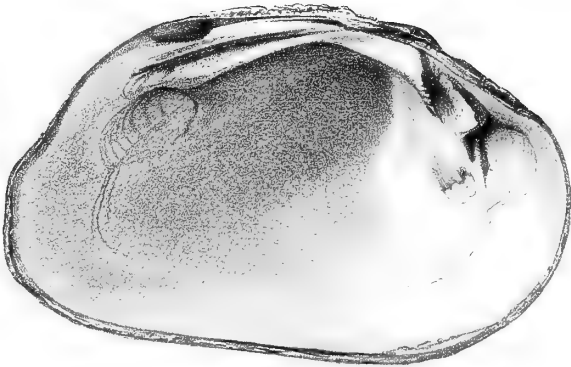
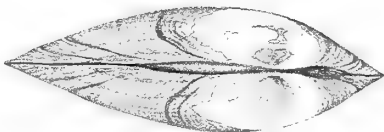
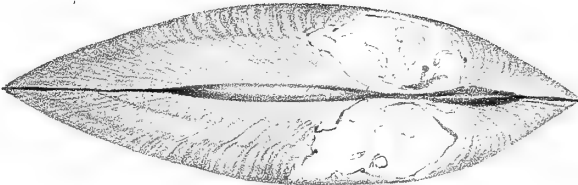
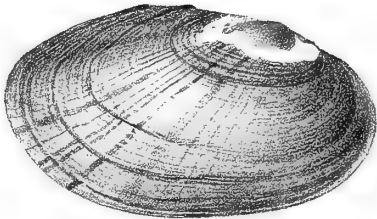
163



162

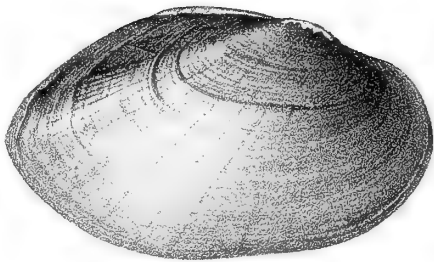


164

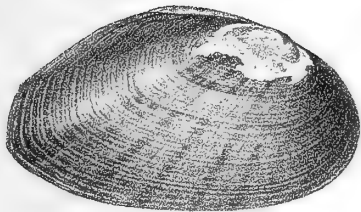


162 *Unio viridans*.
163 *Unio quadratus*.
164 *Unio Jonesi*.

166.



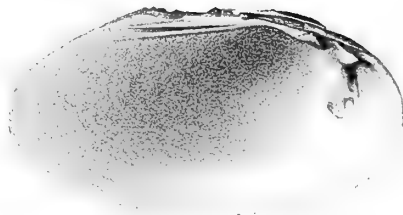
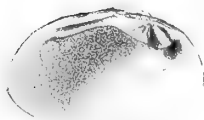
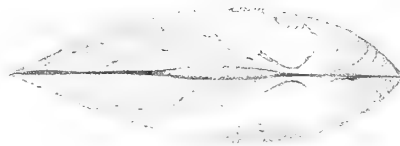
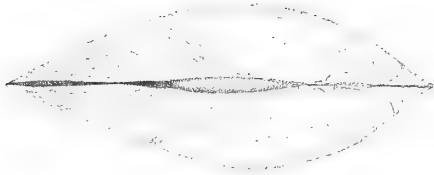
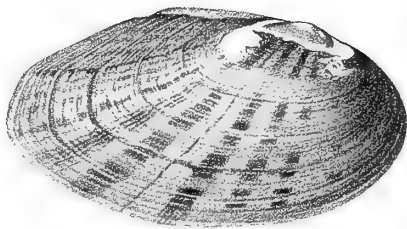
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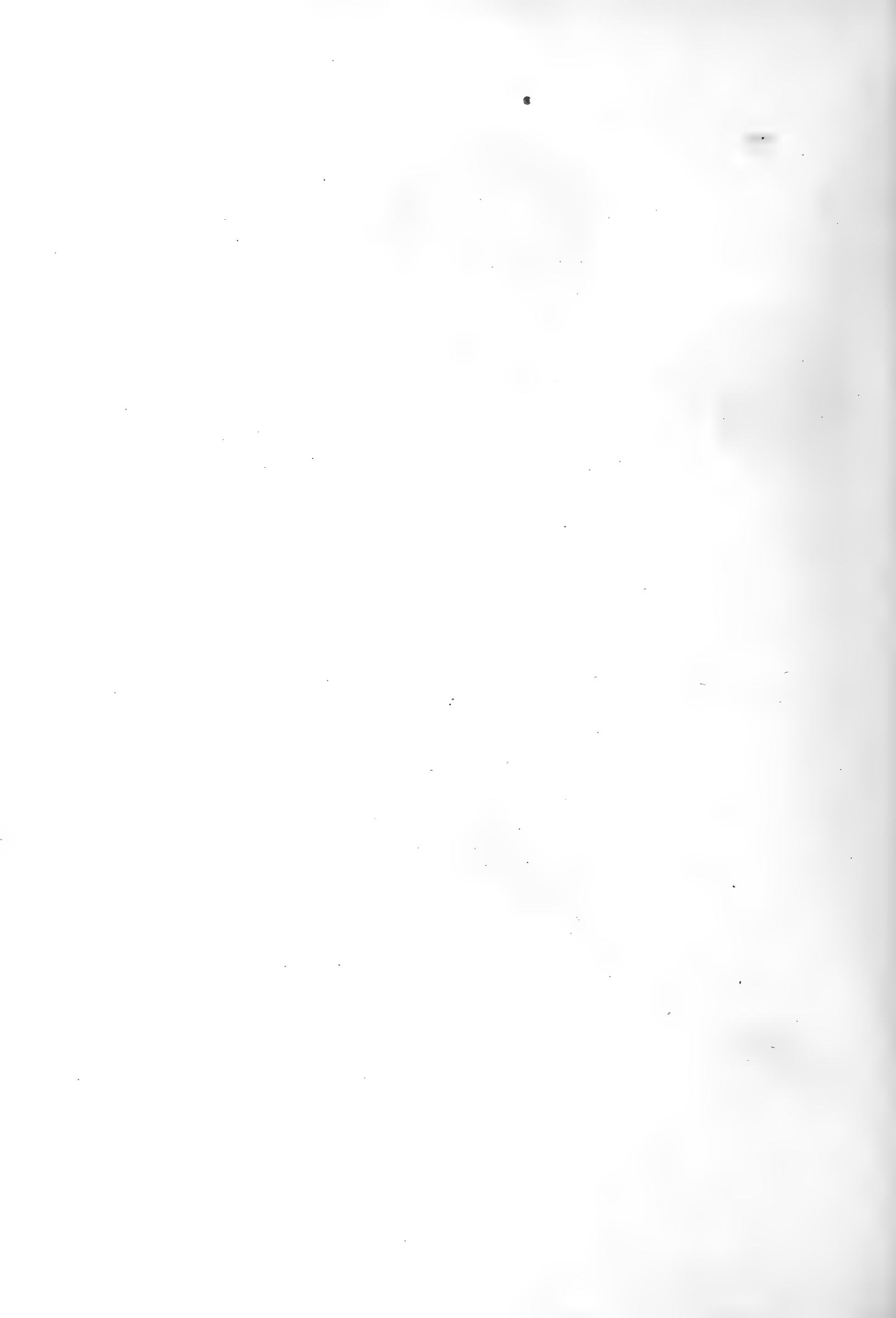
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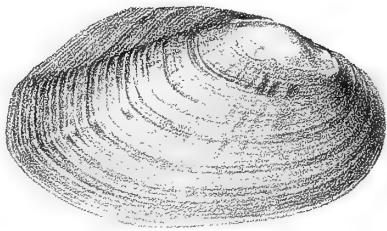
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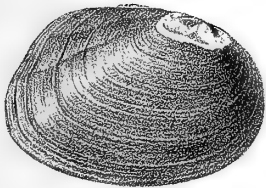
- 165 *Unio discrepans*
166 *Unio virescens*
167 *Unio scitulus*
168 *Unio Johannis*



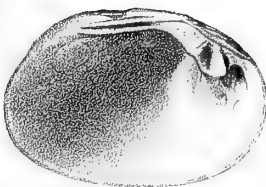
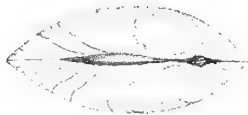
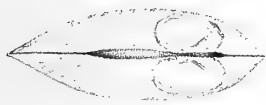
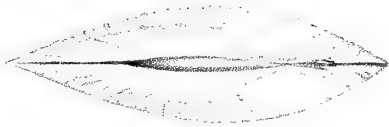
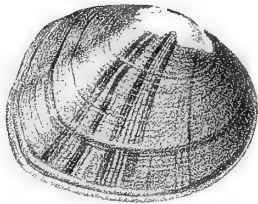
170.



169

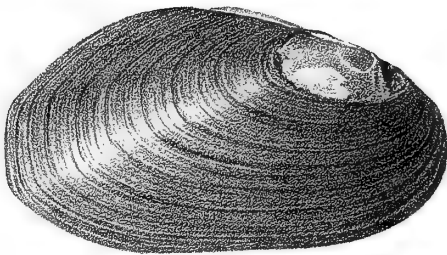


171



169 *Unio cacao*
170 *Unio linguaformis*.
171 *Unio pudicus*.

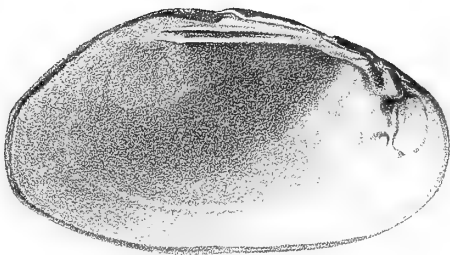
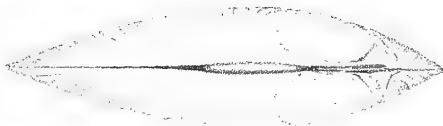
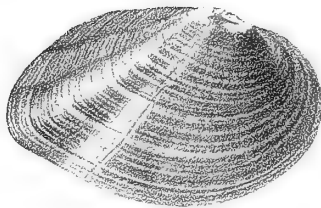
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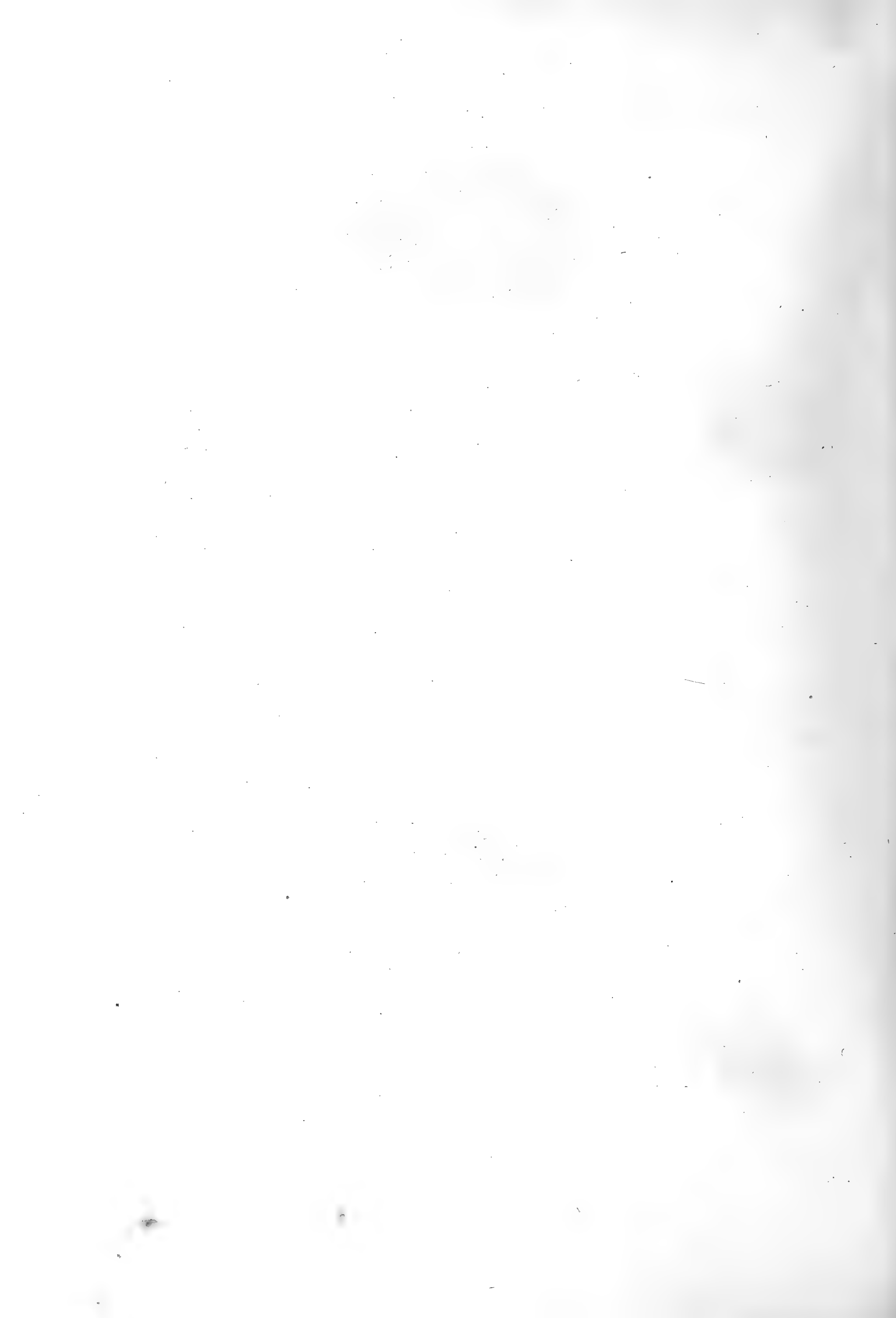
172.



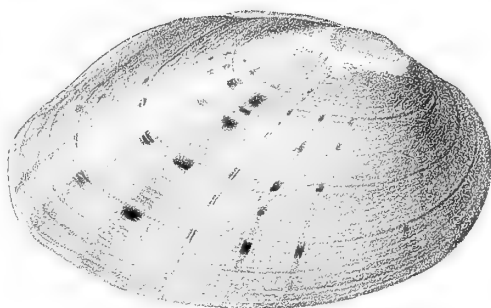
174.



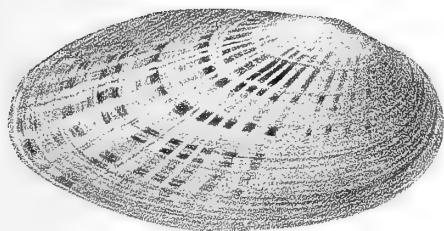
172. *Unio modicellus*
173. *Unio hepaticus*.
174. *Unio castus*.



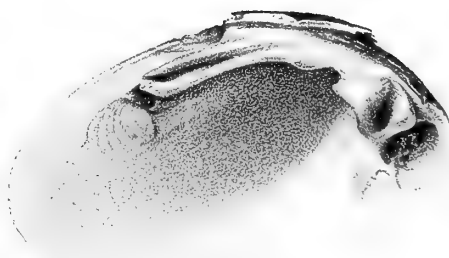
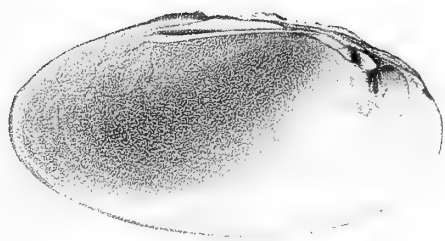
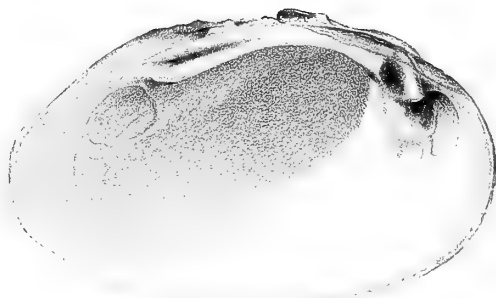
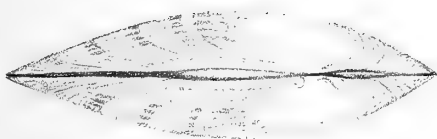
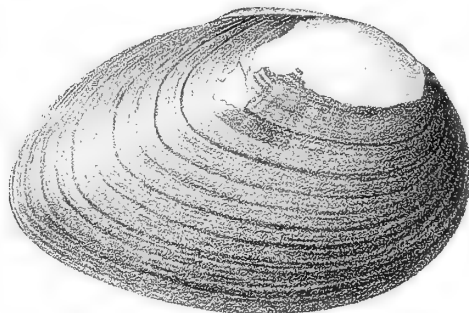
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175



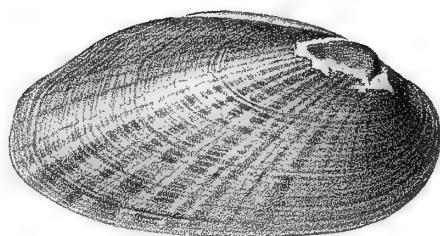
177



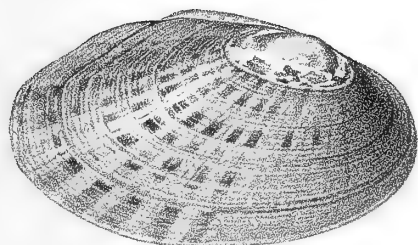
175. *Unio perpictus*.
 176. *Unio lindsleyi*.
 177. *Unio lesleyi*.



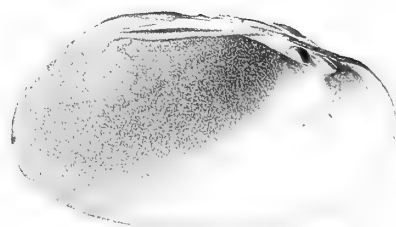
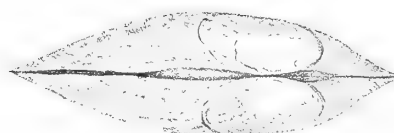
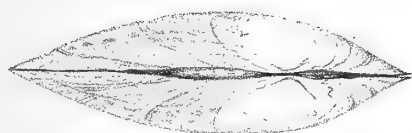
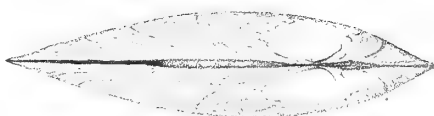
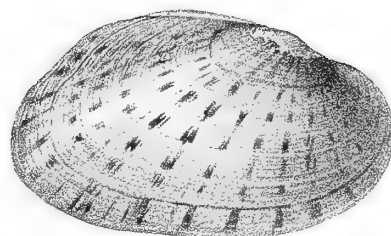
179



178.

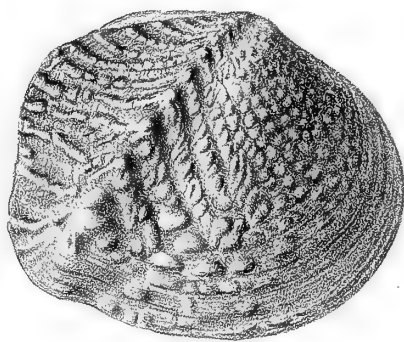


180

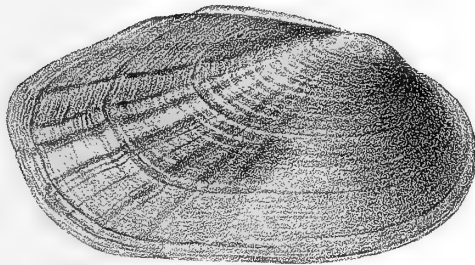


178. *Unio fucatus*.
 179. *Unio planicostatus*.
 180. *Unio camelopardilis*.

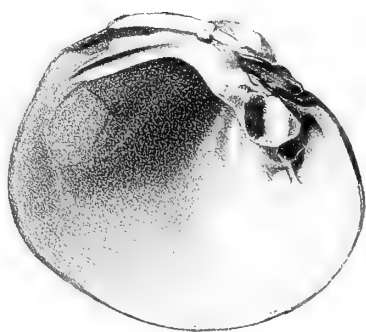
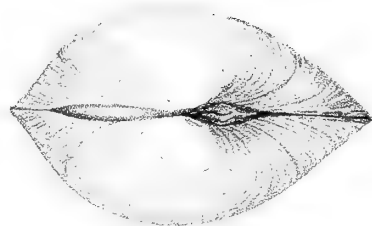
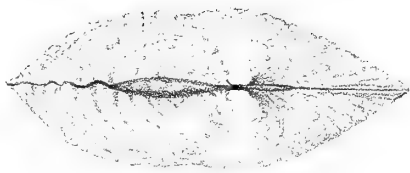
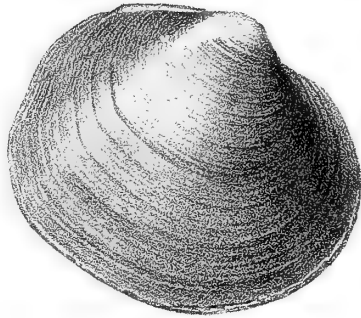
132.



131



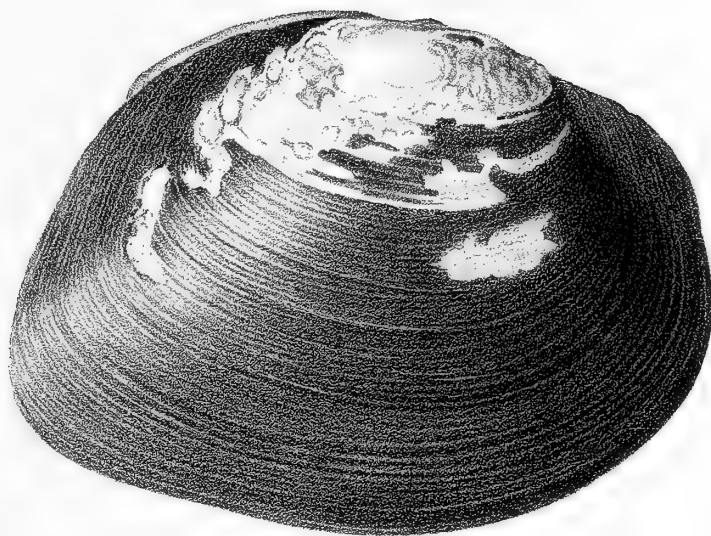
133



- † 131. *Unio Rulersvillensis*
† 132. *Unio Forsheyi*
† 133. *Unio Houstonensis*.



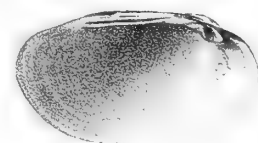
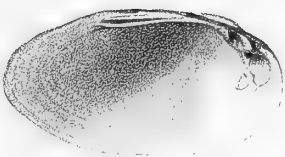
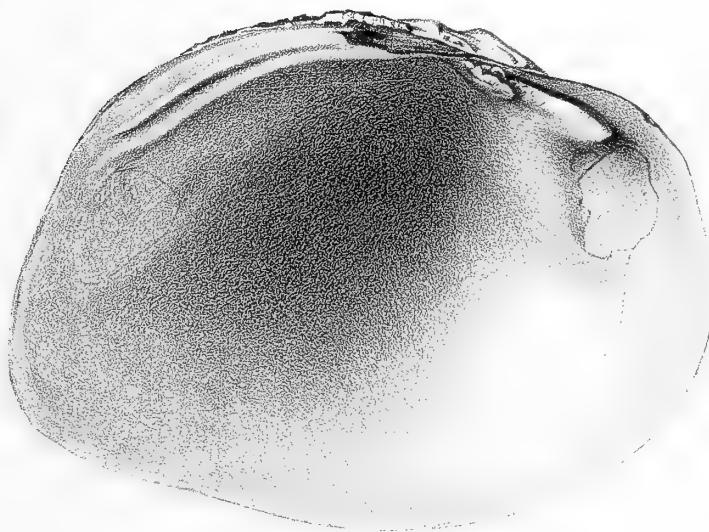
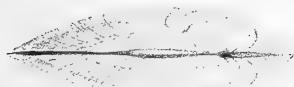
185



184

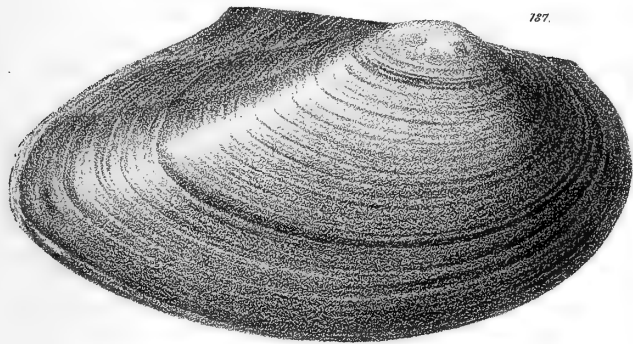


186

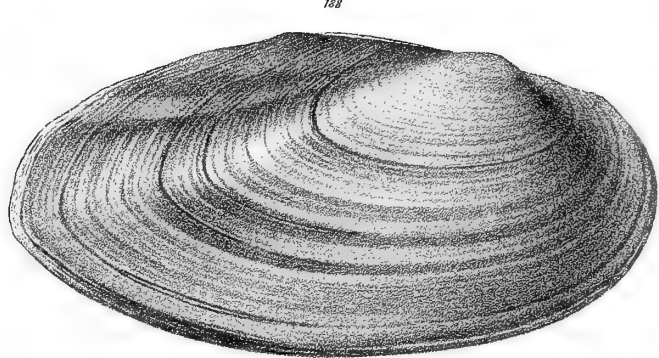


- 184 *Unio Texasensis*
 185 *Unio quadrans*
 186 *Unio Bairdianus*

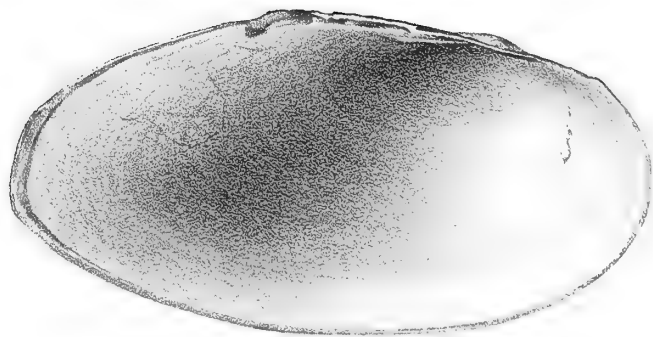
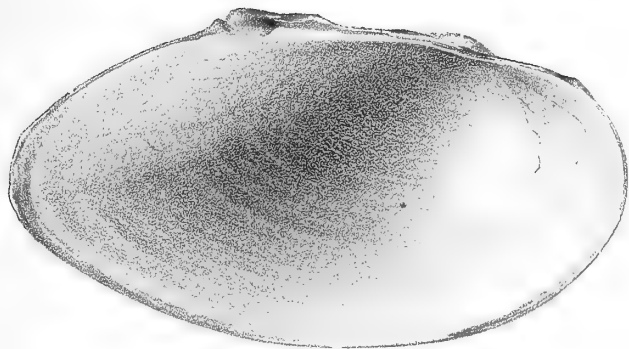
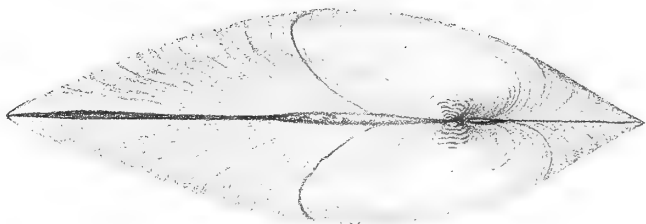
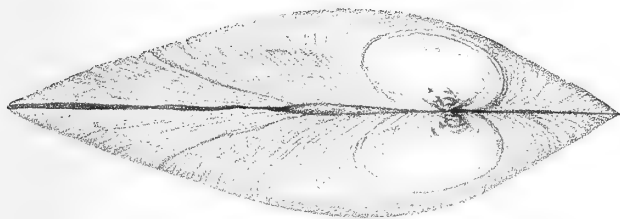




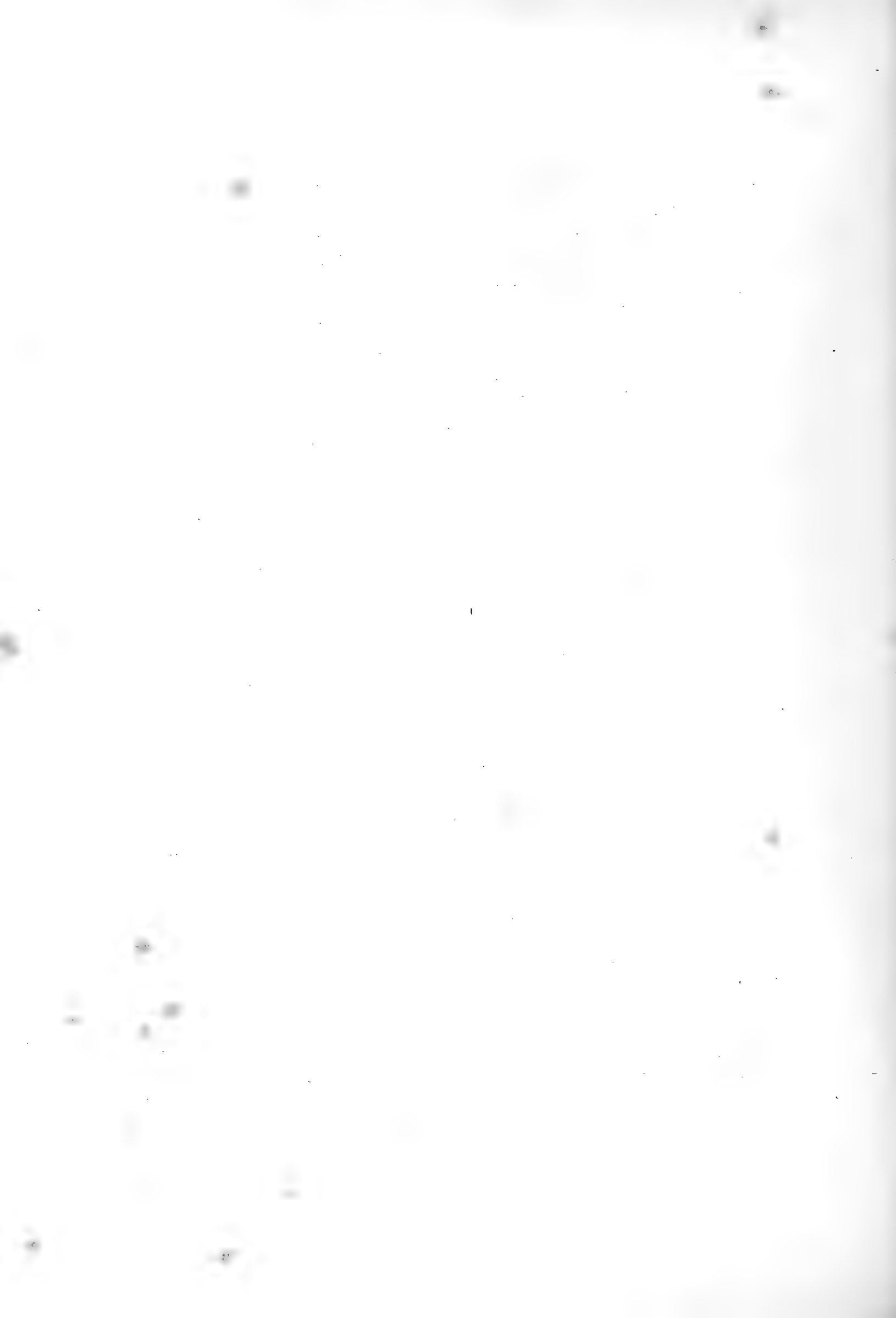
187.

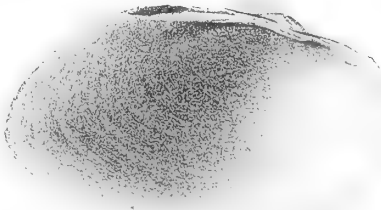
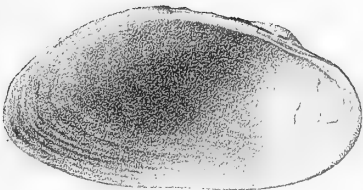
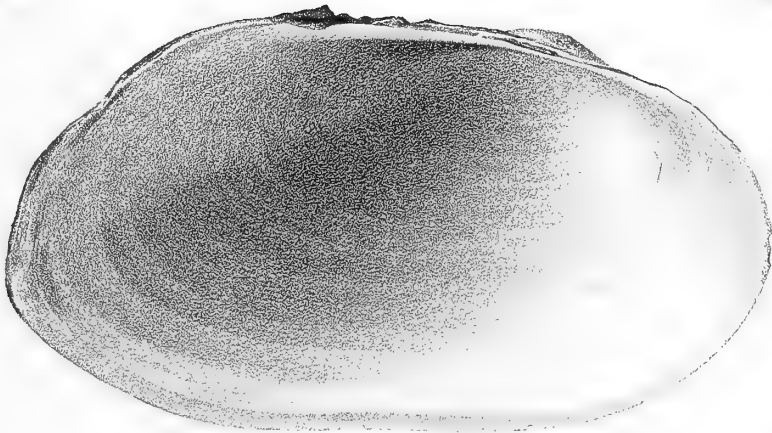
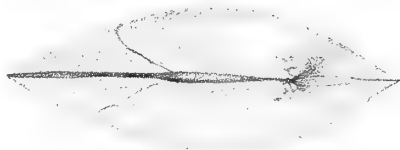
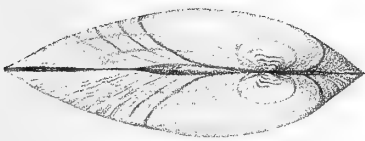
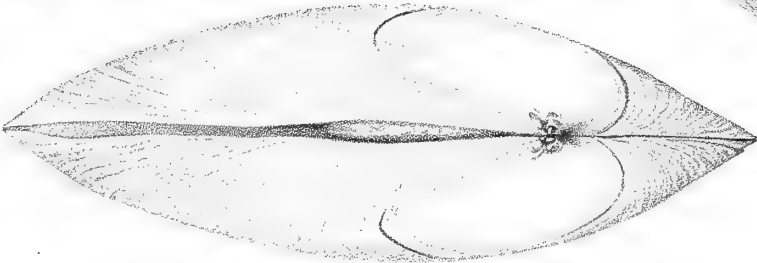
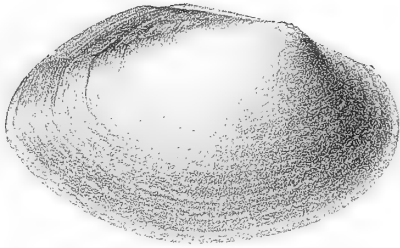
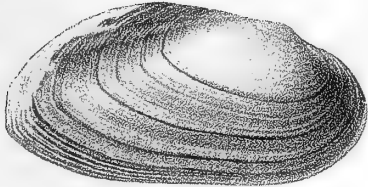
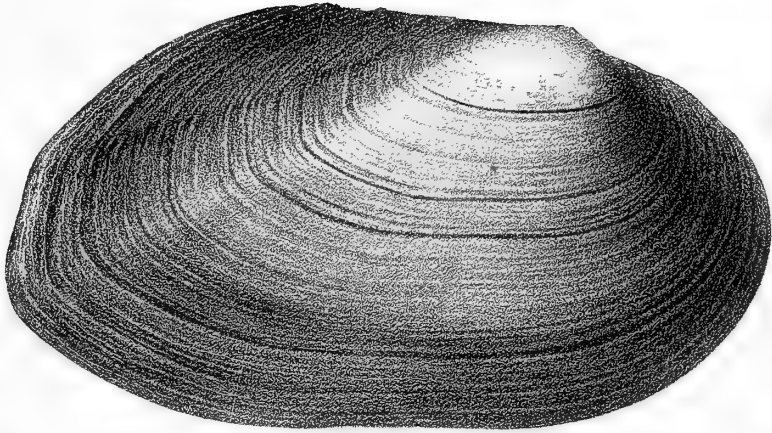


188

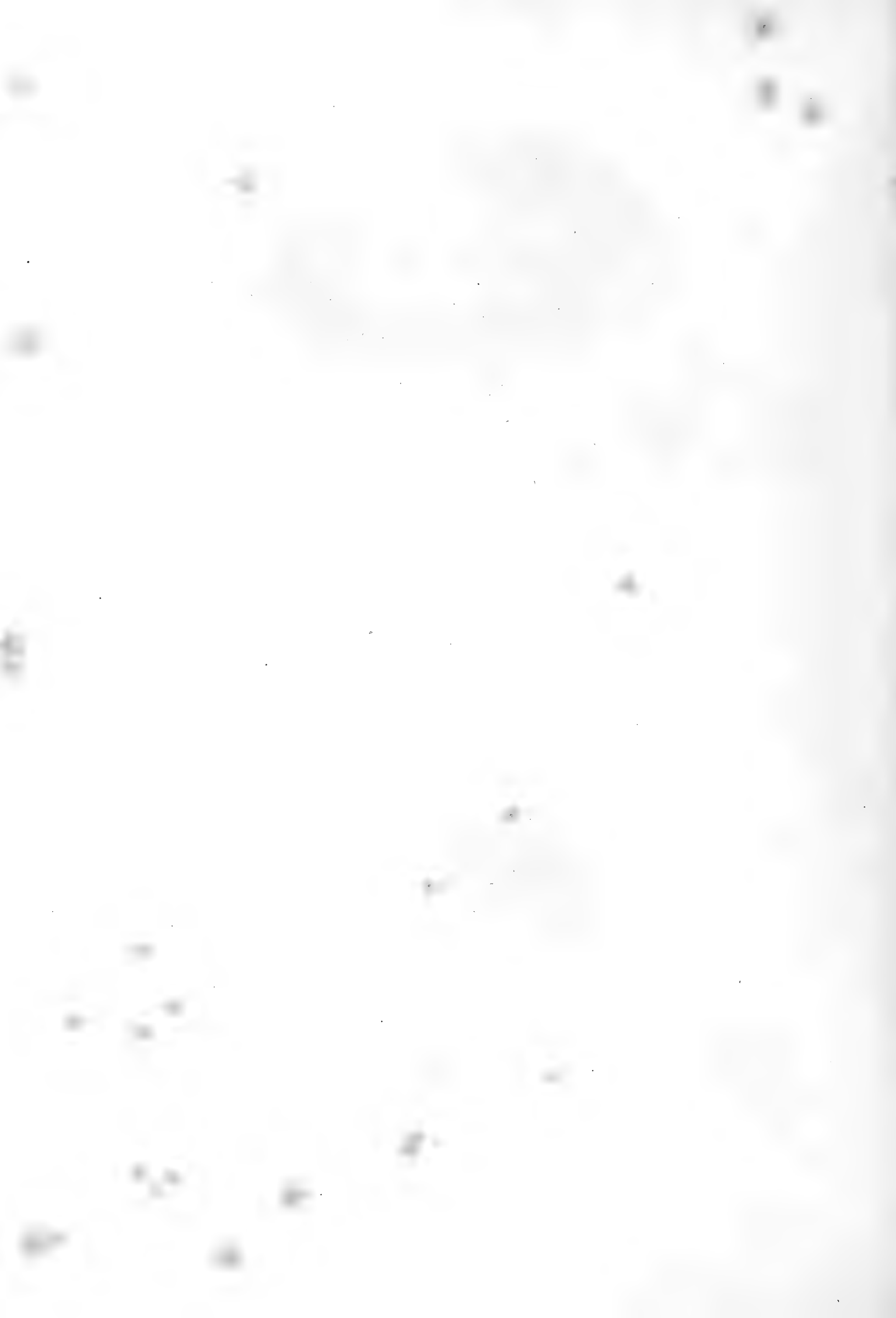


187 *Anodonta lewisii*.
188 *Anodonta lacustris*.

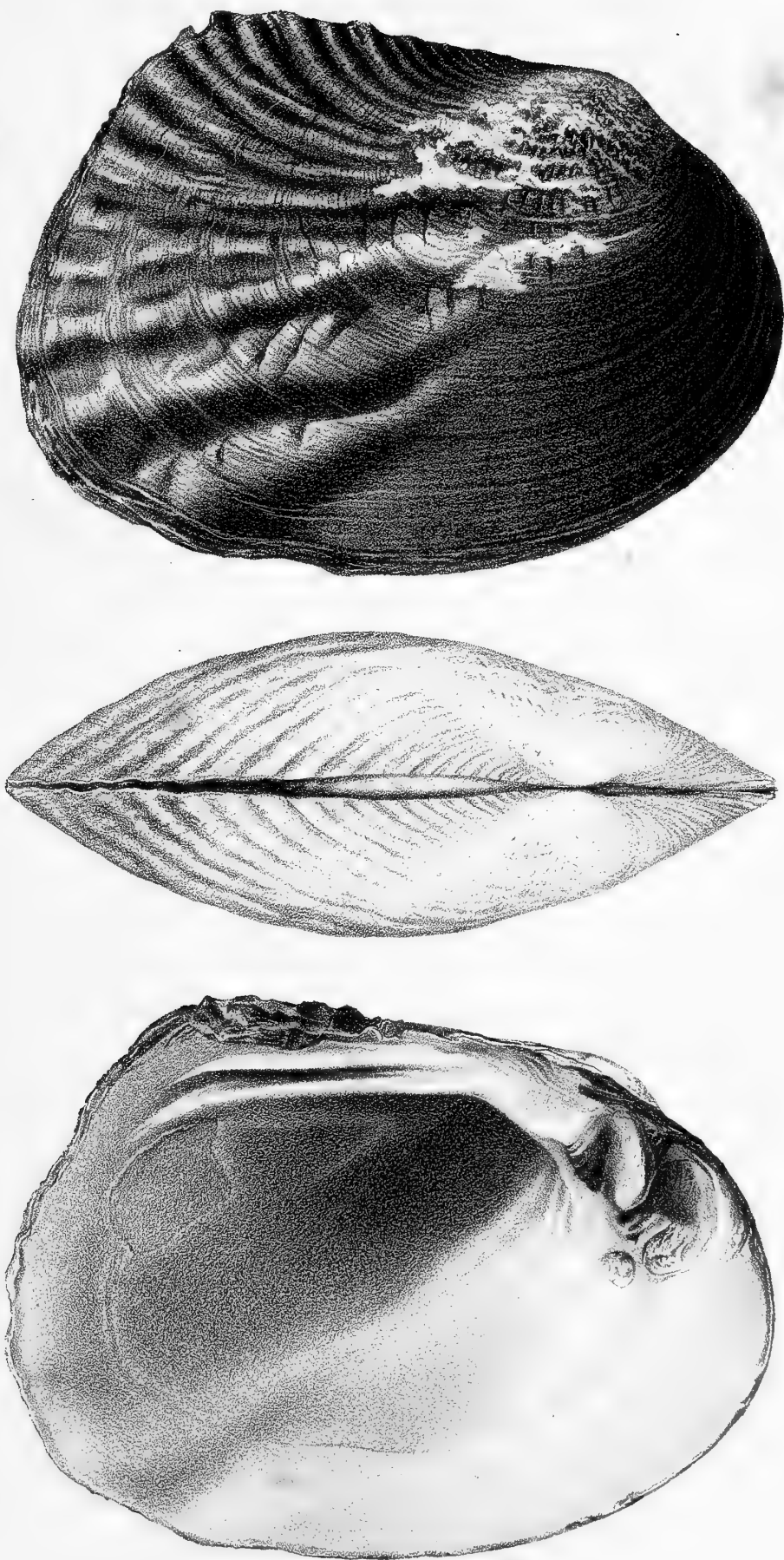




189 *Anodonta modesta*
190 *Anodonta Danielsii*
191 *Anodonta Texasensis*



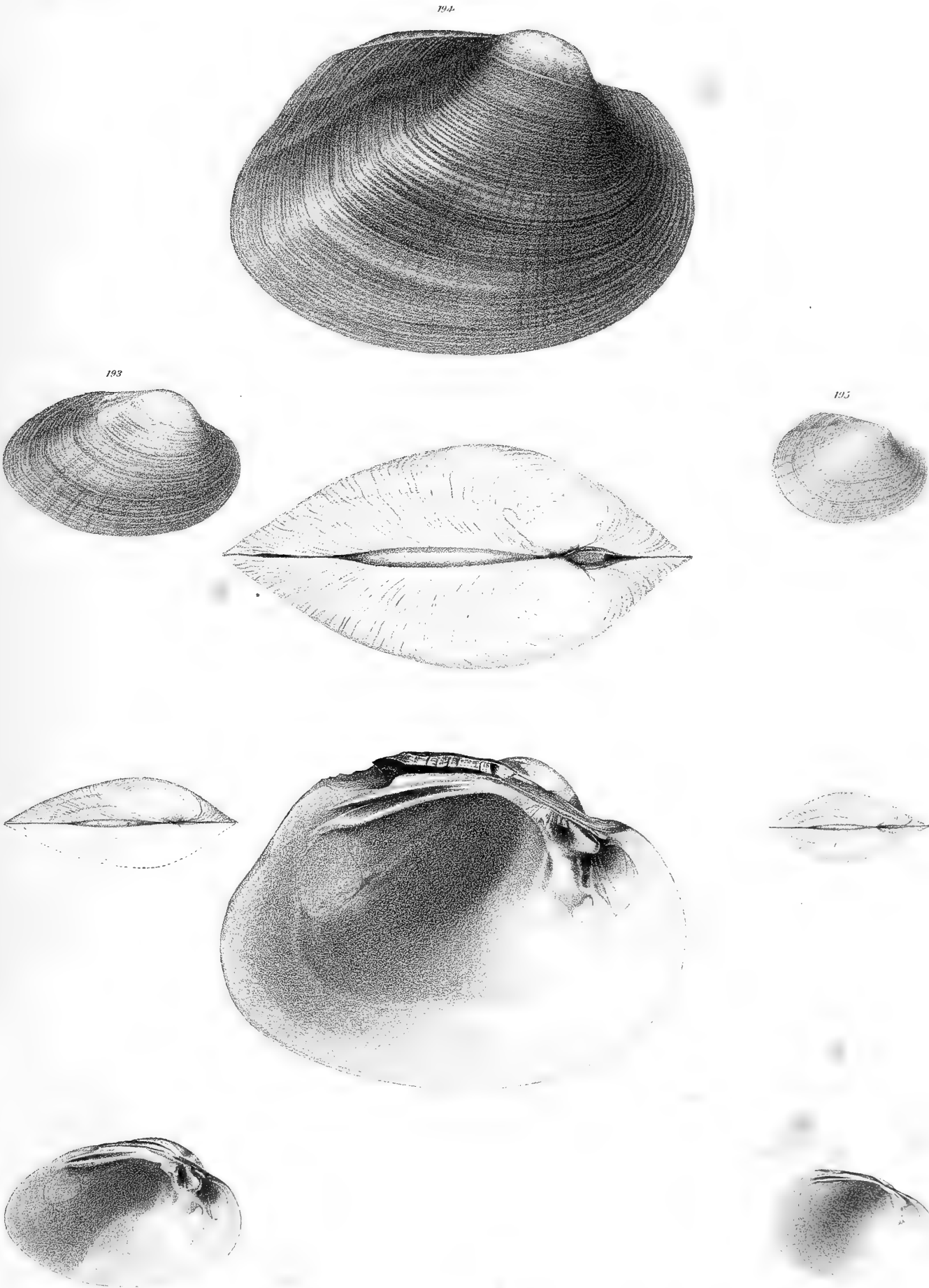
192.



192 *Unio Eightsi*.

T. Sinclair's lith, Phil^a

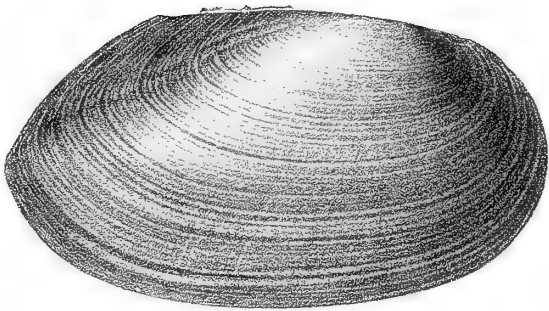




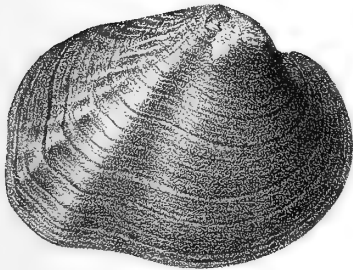
193. *Unio cognatus*
194. *Unio Berlandierii*
195. *Unio Saladoensis*



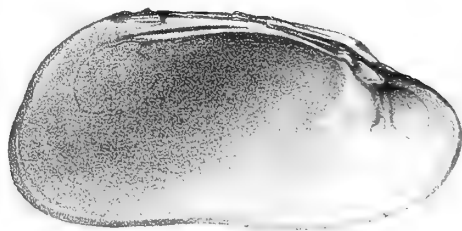
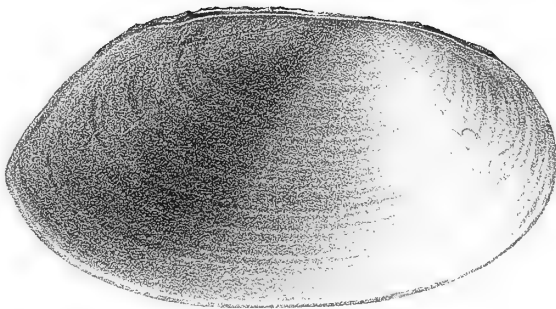
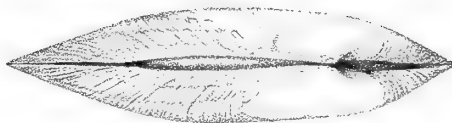
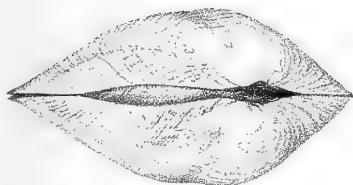
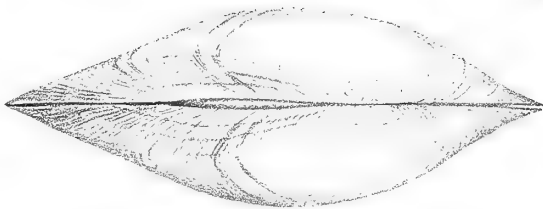
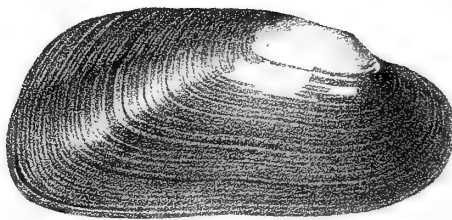
198.



196

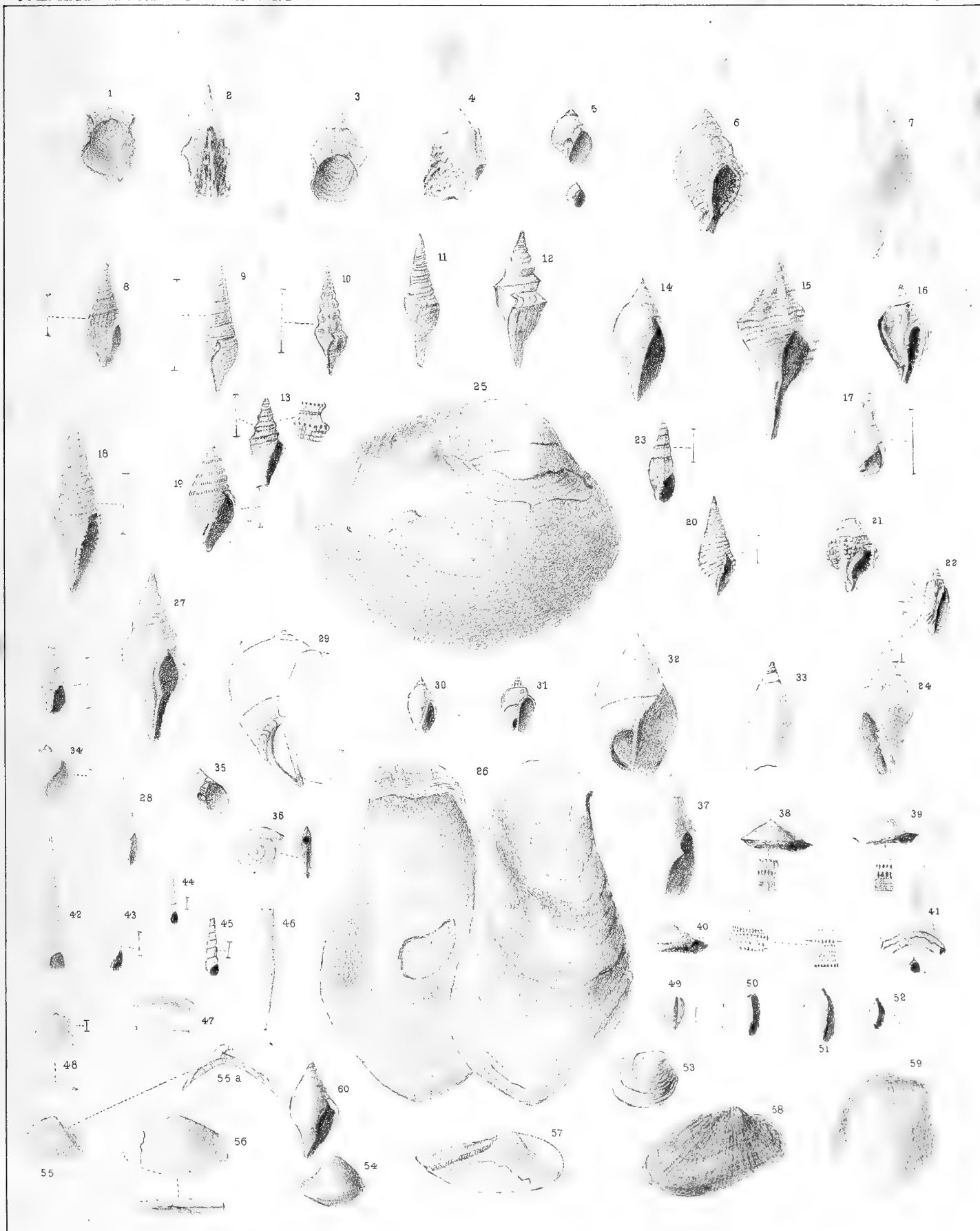


197.



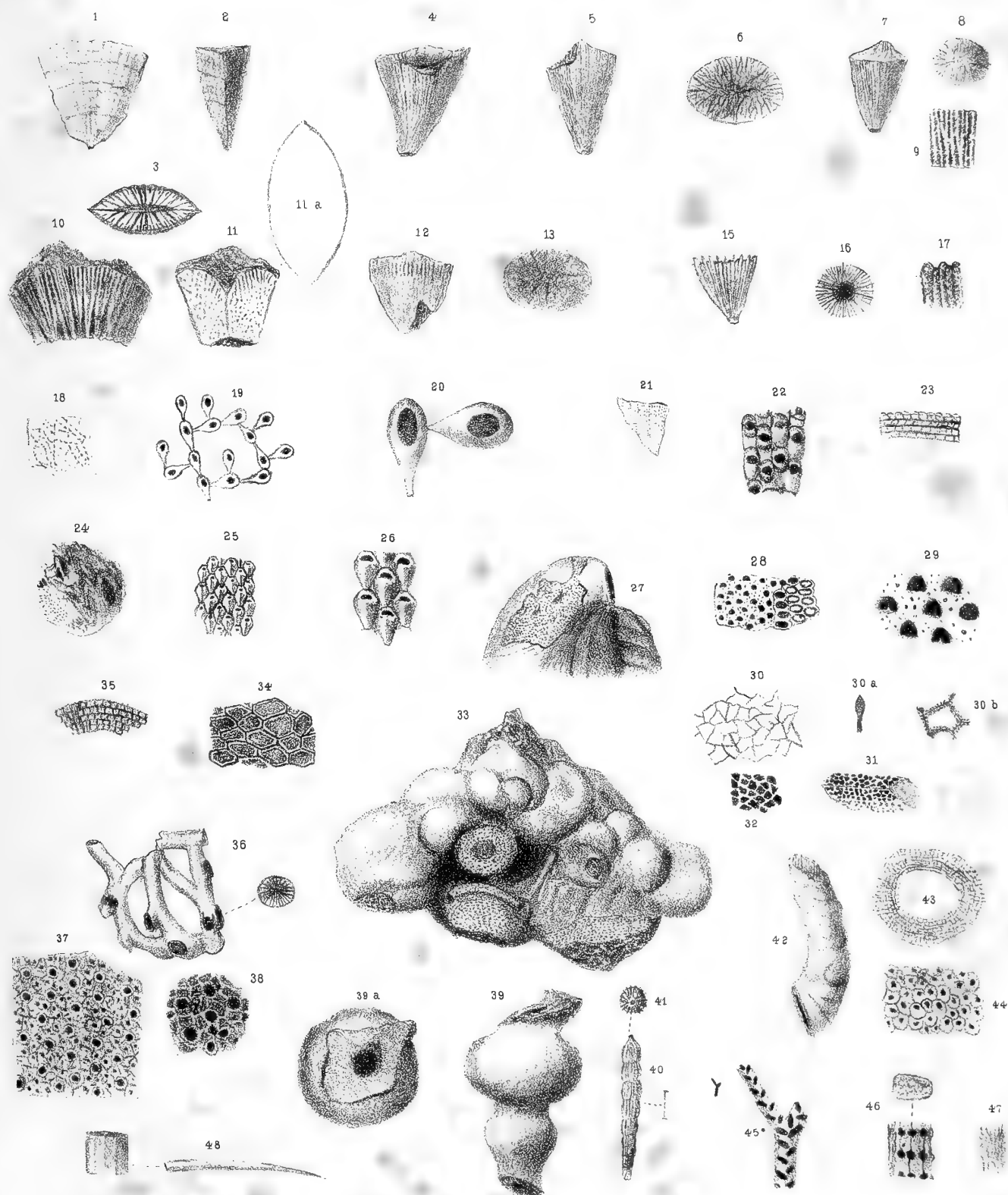
196 *Unio Couchianus*.
197. *Unio Poperi*.
198. *Anodonta Henryana*.











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17.06⁶

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